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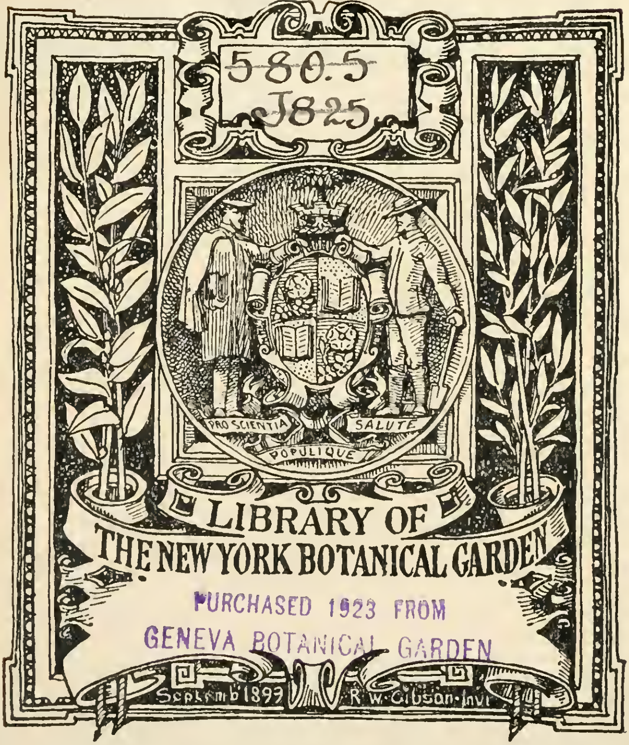

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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.,

Senior Assistant, Department of Botany, British Museum (Natural History).

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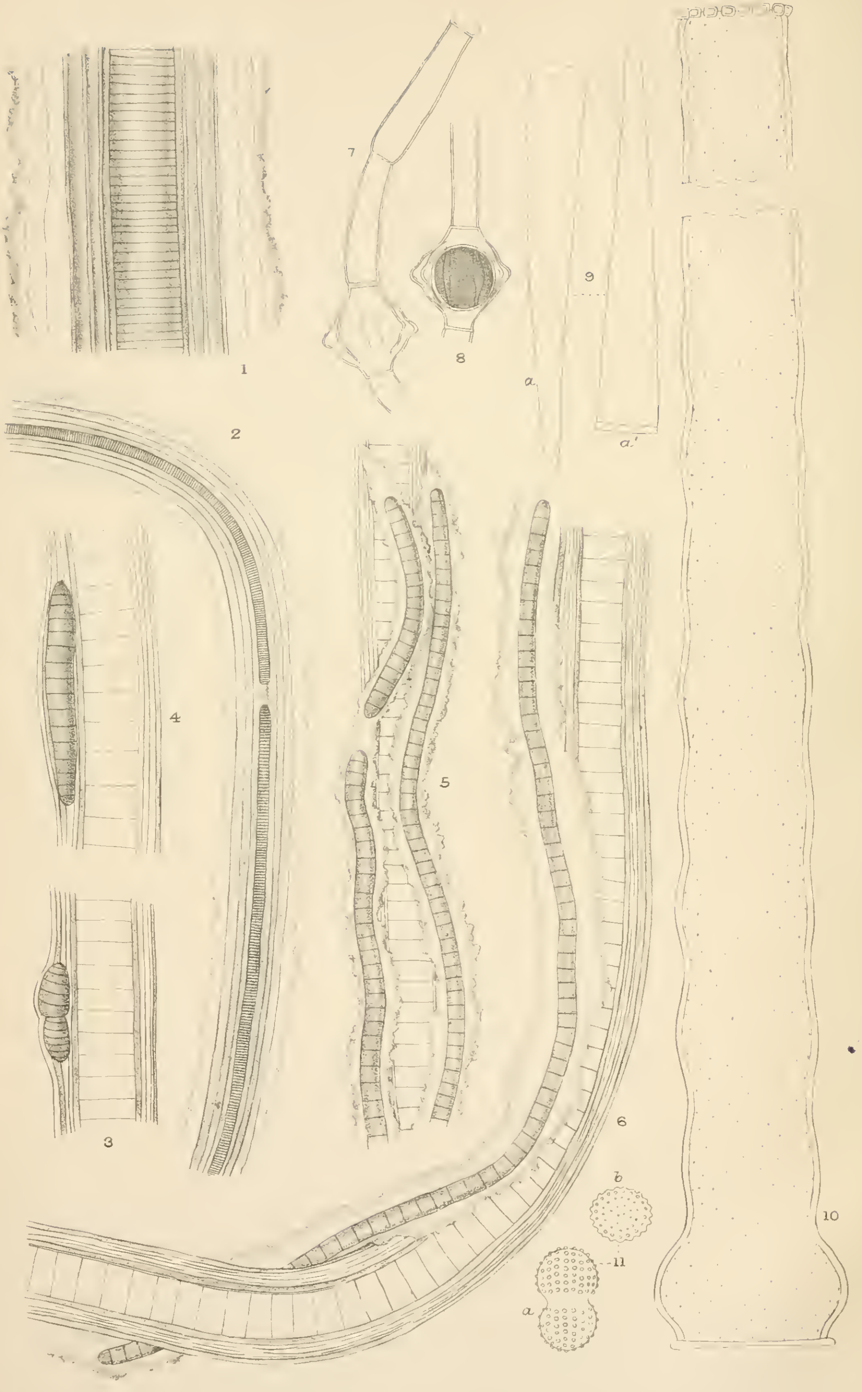
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JOURNAL OF BOTANY

BRITISH AND FOREIGN.

WELWITSCH'S AFRICAN FRESHWATER ALGÆ.

By W. West, F.L.S., and G. S. West, A.R.C.S.

(Plates 365-369.)

The algæ which form the subject of this paper were collected some forty years ago by Dr. Welwitsch during his eight years' residence in Angola. They are chiefly from the latter region, but a few are from Benguella and Sierra Leone. The specimens are all dried ones, and for the most part are mounted on paper. Portions of all had to be soaked out for investigation, the results of which have been very gratifying, as by this means, after a detailed examination, many of the smaller species have been observed. These latter, however, had not been collected, but, independently entangled among other conspicuous species, had been collected with them. The Desmids had practically all been unconsciously obtained in this way, few, if any, collections having been made from places in which one would expect to find Desmids in abundance; and yet about 130 fine species (including fifty undescribed ones) have been found as intruders amongst other algæ. From these mere samples one is led to wonder as to the richness of the Desmid-flora of Tropical Africa.

Very little is known concerning the Freshwater Algæ of Africa, only a few small scattered papers having as yet been published; and this extensive collection—one in which almost all the groups are represented—very considerably enlarges our knowledge of the geographical distribution of these plants. The Diatoms, which are numerous in a few of the gatherings, are left for future investigation.

At the time these algæ were collected the great majority of the species were as yet undescribed. They form part of the Welwitsch collection deposited in the British Museum, and the numbers after the species refer to the numbers on the sheets of this collection. A few of the species can hardly be considered as freshwater ones, but as they were in the collection we have included them.

It is interesting to note that the earliest collection of algæ made in Africa has been found to be more extensive and representative than any hitherto described. The species are localized under the various districts of the region, exactly as indicated by Welwitsch on his herbarium labels.

FLORIDEÆ.

I.—BATRACHOSPERMEÆ.

1. BATRACHOSPERMUM Roth (1800).

1. **B. angolense**, sp. n. *Lemanea angolensis* Welw. MS. Name with observation on gross characters of living plant; the following description is ours:—

B. subcartilagineum, fronde base scutatim radiata, vivum viridi-cærulescens, gracillimum, mox flaccidum, more Floridearum nonnullis viscoso-collapsum, chartæ parum adhærens; fila primaria 5–8 cm.; ramis numerosissimis solitariis binisve (raro ternatis), ramis ordinis secundi tertiique numerosis et delicatissimis; axe primario e serie singula cellularum magnarum formato et seriebus multis cellularum appressarum multe minorum vestito; ramulis lateralibus densissimis et per axem totum regulariter dispersis, e cellulis elliptico-globosis circiter 3 formatis, ramulis sublongioribus ad nodos subnumerosos, ramis juvenibus cum ramulis principaliter ad nodos approximatos. Diam. fil. prim. (c. ramul. lat.) 150–158 μ, ad nod. 266–308 μ; diam. ax. fil. prim. 62 μ, ad nod. 100 μ.

Pungo Andongo. Freq. ast unico loco ad rupes submersas in rivulo de Cabondo socialis cum Podostemaceis; med. Febr. 1857. No. 1.

This may well be taken at first sight for a *Lemanea* with very numerous nodes, the short lateral branches which clothe the axes of the filaments being so very dense and of such uniform length that a surface view appears almost parenchymatous. The filaments are not much thicker at the nodes than between them.

2. **B. nigrescens**, sp. n. B. læte viride in vivo, exsiccata nigrescens; fila primaria circiter 7–10 cm., ad saxa graminumque culmos demersas adnata base radiata; ramis solitariis, binis ternisve, subpenicillatis, numerosissimis et ordinum trium, ultimis delicatissimis; axe primario ut in *B. angolense* sed seriebus exterioribus cellularum numerosioribus; ramulis lateralibus brevissimis, e cellulis rotundato-quadratis 1–3 formatis, longioribus et confertissimis ad nodos numerosissimos, nodo superiori ad nodum inferiorem gradatim brevioribus. Diam. fil. prim. (c. ramul. lat.) 137–141 μ, ad nod. 216–233 μ; diam. ax. fil. prim. 86 μ, ad nod. 112 μ.

Pungo Andongo. Freq. ast unico loco in brachio laterali flum. Cuanza prope ejus cataract. ad Condo; Mar. 1857. No. 2.

This is a rather noteworthy species, being so much branched that in well-developed specimens the branches aggregate to form narrow pencils; the plant when dry is almost black, and looks like some of the marine *Florideæ*.

3. **B. gracillimum**, sp. n. B. multe gracillimum et delicatissimum, non radiatum, viridi-flavescens in vivo, subcæruleo-viride exsiccata, basi nudiusculum; fila primaria 10–15 cm. (interdum e filo breviori et crassiori nata); ramis ordinum duorum, iis ordinis

primarii longis et numerosis, iis ordinis secundi brevibus sparsisque; axe primario e seriebus multis uniformibus parallelis cellularum elongatarum constituto, leviter dilatato ad nodos; ramulis lateralibus brevibus uniformibusque, nonnullis leviter ramosis, per axem totum regulariter (et non dense) dispersis; fasciculis densis globosis magnis ramulorum ramosissimorum e nodo hinc inde (3–5 mm.) ortis. Diam. fil. prim. (c. ramul. lat.) 150–166 μ, ad nod. 250–275 μ; diam. ax. fil. prim. 42–59 μ, ad nod. 66–91 μ; diam. fascic. glob. ramul. 208–480 μ.

Pungo Andongo. Ad lapides submersas in rivulo de Tangue; May 1857. No. 3.

This very beautiful species is characterized by its numerous elongate and delicate branches, which bear the short uniform lateral branches evenly without interruption along their whole length. The globose clusters of lateral branches, which are developed on every 7th to 12th node, are no doubt connected with the fructification; their terminal cells are of a different form to the others, being larger and mostly subglobose. The axis of the filament does not pass through the centre of this dense mass of branches, but the attachment of the globular mass is at one side of the node from which they arise.

4. **B. huillense** (Welw. MS., name only). B. subradiatum, in vivo læte viride, extra aquam mox violaceum, exsiccata nigrescens; fila primaria rubra, dense ramosa; ramis ordinum trium vel quattuor, ultimis plerumque geminatis, brevibus et confertissimis, brevioribus apices versus; axe primario e seriebus parallelis numerosis appositis cellularum formato serie centrali cellularum multe majorum; ramulis lateralibus brevibus densisque plus minusve uniformibus, ad nodos densioribus, axe juxta supra nodos subglabro; ordine intermedio ramorum submoniliformi, ramis juvenibus nodis approximatis submoniliformibusque. Diam. fil. prim. (c. ramul. lat.) 191–325 μ, ad nod. 275–400 μ; diam. ax. fil. prim. 125–275 μ, ad nod. 175–325 μ.

Huilla. Freq. ad rupes lapidesque submersas in rivulis prope Lopollo; May 1860. No. 4. Also fragments from No. 187.

This species is well marked by its peculiar and dense branching, specimens dried on paper appearing hypnoid. It reminds one of a delicate *B. atrum* Harv., except as to its branching. This species and *B. gracillimum* adhere very well to paper, while *B. nigrescens* and *B. angolense* adhere but slightly.

II.—HILDENBRANDTIACEÆ.

1. HILDENBRANDTIA Nardo (1845).

1. H. RIVULARIS (Liebm.) J. Ag. *Species Algar.* ii. 495; Rabenh. *Fl. Europ. Alg.* iii. 408. Diam. cell. 3·5–4 μ.

Golungo Alto. Maculis magnis belle sanguineis rupes siliceo-arenosas juxta Fontem de Capopa ornat; Sept. 1855. No. 149.

2. H. ANGOLENSIS Welw. MS.; name with partial description; the following description is ours:—

H. roseo-purpurea, saxa silicacea rivulorum colore amœnissime roseo ornans; cellulis quadratis, interdum subquadratis sed semper angularibus, in seriebus verticalibus ordinatis. Diam. cell. 3·5–5 μ.

Golungo Alto. Ad silices in rivulis sylv. primit. de Quibanga pr. Sange, June 1857. No. 150 (I. and II.). Welwitsch remarks that the rocks were of a most beautiful rose-colour for half an hour's walk along the stream.

CHLOROPHYCEÆ.

III.—ŒDOGONIACEÆ.

1. BULBOCHÆTE Ag. (1817).

1. B. ANGULOSA Wittr. & Lund. in Wittr. *Prodr. Monog. Œdog.* 45 (1874). Crass. cell. veget. 12·5–15 μ; altit. 1½–2¼-plo major; crass. oogon. 40–44 μ; altit. 35–40 μ; crass. nannandr. 6–7·5 μ; altit. 23–27 μ; crass. androsporang, 10–12 μ; altit. 9·5–13·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

In these African plants the oogonia were under the androsporangia, and were rotundo-rhomboid, with the superior margins straight (not retuse); the nannandria were not epigynous, but scattered.

2. ŒDOGONIUM Link (1820); Wittr. em.

1. Œ. CRYPTOPORUM Wittr. *Dispos. Œdog. Suec.* 19 (1870). Crass. cell. veget. 7·5 μ; altit. 3½–4½-plo major; crass. oospor. 22–23 μ; altit. 21–22 μ.

Loanda. Represa do Maghelano pr. Boa vista; Feb. 1854. No. 194.

2. Œ. CRISPUM (Hass.) Wittr. *Prodr. Monog. Œdog.* 10 (1874).

Var. URUGUAYENSE Magn. & Wille, *Bidrag til Sydamerik. Alg.-fl.* 39, t. ii. fig. 63 (1884). Crass. cell. veget. 13·5–15 μ; altit. 2½–5-plo major; crass. oogon. 31–34 μ; altit. 28–32 μ; crass. oospor. 28–32 μ; altit. 27–31 μ.

Loanda. Represa do Maghelano pr. Boa vista, c. *Œ. cryptoporum*; Febr. 1854. No. 194.

3. Œ. GRACILLIMUM Wittr. & Lund. in Wittr. *Prodr. Monogr. Œdog.* 15 (1874).

Forma MAJOR. Crass. cell. veget. 6·5–7 μ; altit. 3½–6-plo major; crass. oogon. 20–23 μ; altit. 32–35 μ; crass. oospor. 17 μ; altit. 24 μ.

Huilla. In udis sylvaticis et apricis inter Monino et lac. Ivantala, c. *Porphyrosiphon Notarisii* Kütz.; April 1860. No. 14.

4. Œ. ITZIGSOHNII De Bary, *Ueb. Œdog. und Bulb.* 56, t. iii. fig. 29–32 (1864); Wittr. *Prodr. Monogr. Œdog.* 16.

Var. MINOR West, Notes on Scotch Freshw. Alg., *Journ. Bot.* April, 1893. Crass. cell. veget. 4·8–5·7 μ; altit. 5–8-plo major; crass. oogon. 21–29 μ; altit. 17–30 μ; crass. oospor. 13·5–18 μ; altit. 13–18 μ.

Pungo Andongo. Freq. c. *Scytonema myochrous* (Dillw.) Ag. var. *chorographicum*, temp. pluv. (i.e. Dec. usque Apr.) læte vegetans, ad Pedras negras in summis rupibus; Febr. 1857. No. 6.

The specimens were even a little smaller than those originally described from the Orkney Isles.

5. **Œ. huillense**, sp. n. (tab. 365, figs. 7, 8). Œ. monoicum (?); oogoniis singulis, subrhomboideis, angulis lateralibus mammiformibus, a vertice visis stellatis cum processubus æqualibus 8; oosporis globosis, oogonia non complentibus. Crass. cell. veget. 7·5 μ; altit. 4–5-plo major; crass. oogon. 24–26 μ; altit. 24–26 μ; crass. oospor. 17 μ; altit. 17 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

The nearest species to this is *Œ. mammiferum* Wittr. (*Prodr. Monogr. Œdog.* 16), from which it differs in having *eight equal* processes round the *subrhomboid* oogonia, and in the globose oospores.

6. Œ. Rothii (Le Cl.) Pringsh. *Beitr. zur Morph. d. Œdog.* i. 69, t. v. fig. 4 (1858); Wittr. *Prodr. Monogr. Œdog.* 18.

Forma major. Crass. cell. veget. 8·5–10·5 μ; altit. 3½–4½-plo major; crass. oogon. 25–30 μ; altit. 19–25 μ: crass. nannandr. 4·5–9·5 μ; altit. 8·5–11·5 μ; crass. androsporang. 7·5 μ; altit. 9·5–11·5 μ.

Pungo Andongo. Alga læte viridis parce vel submucosa, ad ramulos Podostemacearum in rivulis (Casalalé); March 1857. No. 105.

The small obovate nannandria occurred singly or 2–4 on the under side of the oogonia.

7. **Œ. hormosporum**, sp. n. Œ. dioicum, nannandrium; oogoniis 3–10 continuis, subglobosis vel ovato-ellipsoideis, apicem versus circumscissilibus; oosporis subglobosis vel ellipsoideis, oogonia complentibus, membrana crassa glabraque; cellulis suffultoriis tumidis; androsporangiis 11–15-cellularibus; cellula terminali obtusa, interdum oogonium est; nannandribus curvatis, 2-(?)-cellularibus, in cellulis suffultoriis sedentibus. Crass. cell. veget. 22–27 μ; altit. 4½–6-plo major; crass. oogon. 48–56 μ; altit. 56–75 μ; crass. oospor. 46–54 μ; altit. 54–61 μ; crass. nannandr. 9–11·5 μ; altit. 47–54 μ; crass. androsporang. 18–19 μ; altit. 21–24 μ.

Huilla. Alga lubrica, viridis, socialis cum *Nitella* sp. in stagnis pr. Catumba; April 1860. No. 189.

8. **Œ. Welwitschii**, sp. n. Œ. dioicum, macrandrium; oogoniis singulis geminisve, tumidissimis, prope apicem circumscissilibus; oosporis globosis (vel raro subglobosis), pæne oogonia complentibus, membrana crassa glabraque; filis masculis paullo gracilioribus quam femineis. Crass. cell. veget. (♂) 17–19 μ; altit. 3–4-plo major; crass. cell. veget. (♀) 18–24 μ; altit. 2–3-plo major; crass. oogon. 40–46 μ; altit. 37–50 μ; crass. oospor. 35–38·5 μ; altit. 36–37 μ.

Libongo. Freq. ad margines flum. Lifune; Sept. 1858. No. 204.

9. Œ. tapeinosporum Wittr. *Prodr. Monogr. Œdog.* 36 (1874).

Var. angolense, var. n. Var. cellulis vegetativis paullo crassioribus, oosporis oogonia complentibus. Crass. cell. veget. 3·8–4·5 μ; altit. 5–6-plo major; crass. oogon. 18–19 μ; altit. 13·5–15 μ.

Pungo Andongo. Ad latera boreal. et occid. de Pedra Songue, c. *Scytonema myochrous* var. *chorographicum* et *Dichothrix gypsophila*; April 1857. No. 12.

10. Œ. LONDINENSE Wittr. *l. c.* 39 (1874). Forma oogoniis supra medium circumscissilibus, cellulis suffultoriis sæpe inflatis. Crass. cell. veget. 12·5–13·5 μ; altit. 4–6-plo major; crass. oogon. 26–31 μ; altit. 27–34 μ; crass. oospor. 24–28 μ; altit. 24–28 μ.

Pungo Andongo. In pascuis spongiosis breve graminosis juxta rupes gig. pr. Catete, sparsis c. *Dichothrix gypsophila;* May 1857. No. 111.

11. **Œ. angustissimum,** sp. n. Œ. monoicum (?); filis vegetativis irregulariter flexis et angustissimis; oogoniis binis, transverse inflatis; oosporis transverse ellipticis, partem inflatam oogonii complentibus, membrana glabra. Crass. cell. veget. 1·8–2 μ; altit. 7–14-plo major; crass. oogon. 9·5 μ; altit. 10·5–14·5 μ; crass. oospor. 9·5 μ; altit. 6·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15.

This species comes nearest to *Œ. tenuissimum* Hansg. (in *Notarisia*, 1888, 398), but differs in being narrower, in having longer cells, binate oogonia, and smaller oospores which completely fill the latter.

12. ŒDOGONIUM sp. Crass. cell. veget. 2·3–3·2 μ; altit. 5–12-plo major.

Huilla. Epiphyticum in *Zygnema* sp., in paludibus exsiccandis; April 1860. No. 176. This species may be a form of *Œ. tenuissimum* Hansg. with longer cells, or of *Œ. minutissimum* Grun. (in Rabenh. *Fl. Europ. Algar.* iii. 352).

13. ŒDOGONIUM sp. Crass. cell. veget. 8·5 μ; altit. 6–7-plo major; crass. oogon. 24–30 μ; altit. 26–33 μ; crass. oospor. 23–29 μ; altit. 23–29 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca, et Lopollo; May 1860. No. 15. Insufficient for accurate determination.

14. ŒDOGONIUM sp. Crass. cell. veget. 25–32 μ; altit. 1½–3-plo major.

Mossamedes. Freq. in stagnis puris ad ripas flum. Bero; Aug. 1859. No. 190.

15. ŒDOGONIUM sp. Crass. cell. veget. 56–63 μ; altit. 1–2-plo major.

Pungo Andongo. Stirps amœnissime viridis, ad limum juxta rivulum Casalalé crescens; Febr. 1857. No. 106. Ad ramulos Podostemacearum in rivulis (Casalalé); Mar. 1857. No. 105.

IV.—ULVACEÆ.

1. ENTEROMORPHA Link (1820); em. J. Ag. (1883).

1. E. WELWITSCHII J. Ag. *Till Algernes Systemat.* vi. 143 (1883). *Enteromorpha* sp. Welw. *Phyc. Lusit.* n. 289. Long. usque 4–5 mm.; lat. 21–61 μ; diam. cell. 5–11·5 μ.

Loanda. Ad folia palmarum (*Cocos nucif.*) diutius in oceano agitata, prope Praia de Nazareth; Febr. 1854. No. 29.

The occurrence of this species is noteworthy, as Welwitsch had previously collected it in Portugal on *Scirpus maritimus*.

2. E. TUBULOSA Kütz. *Tab. Phyc.* vi. 32, f. 2. Long. usque 3–4 cm.; lat. 60–270 μ; diam. cell. 8–21 μ.

Loanda. On a floating *Adansonia digitata* on the shore of S. Jago, forming a green layer all over it, Nov. 1853. No. 31.

(To be continued.)

MICROSCOPIC FUNGI NEW TO, OR RARE IN, BRITAIN.

By Annie Lorrain Smith.

The Fungi included in the following list have been sent to me at various times for identification or verification, or they have been collected by myself. Nine species (to which an asterisk is prefixed) are new to Britain, and two genera—*Piptocephalis* and *Lizonia*. For the discovery of the former we are indebted to C. F. Jenkin, Esq., Newport, Monmouth, who is specially to be congratulated for the interesting additions he has made to our too scanty records of Phycomycetes. The various species of Hyphomycetes I have obtained from the culture of material in the Botanical Laboratory of the British Museum, Cromwell Road. I have recorded in each case the district from which the leaves, &c., were gathered. It is almost certain that most or indeed all of them are of frequent occurrence, but from their microscopic nature they have easily been overlooked by field-workers.

Gonatobotrys simplex has been found growing on decaying fruits of black bryony; I got it growing very plentifully on the stalks and fruits of white bryony. The two hosts have something of the same habit of growth, which accounts for the appearance of the fungus.

*PERONOSPORA RADII De Bary. On leaves of *Chrysanthemum segetum*. Dalton, Dumfriesshire, Aug. 1894, *A. L. S.*

SPORODINIA GRANDIS Link and SYZIGITES MEGALOCARPUS Ehrenb. On decaying fungi. Annan, Dumfriesshire, Aug. 1896. Rare.

*MORTIERELLA ROSTAFINSKII Bref. On a dead fir-stump at Strathpeffer, Ross-shire, N.B., Aug. 1896, *Mr. Jenkin*.

M. CANDELABRUM Van Tiegh. & Le Mon. On a decaying fungus. Strathpeffer, Aug. 1896, *Mr. Jenkin*.

*SYNCEPHALIS CORNU Van Tiegh. & Le Mon. On a patch of earth and moss. Newport, *Mr. Jenkin*.

*PIPTOCEPHALIS FRESENIANA De Bary. Parasitic on *Pilaria* on rabbit-dung. Strathpeffer and Newport, *Mr. Jenkin*.

*P. CYLINDROSPORA Bainier. On a patch of earth and moss, along with *Syncephalis*. Newport, *Mr. Jenkin*.

*ACHYLA APICULATA De Bary. On the mouths of *Utricularia* bladders. Strathpeffer, Aug. 1896, *Mr. Jenkin*.

*LIZONIA EMPORIGONIA De Not. On the flower-heads of *Polytrichum commune*. Found by Mr. Lloyd Williams on material in the laboratory of the Pharmaceutical Society.

OEDOCEPHALUM PREUSSII Sacc. On decaying herbaceous stalks, leaves, &c. Annan, Dumfriesshire, Aug. 1896, *A. L. S.*

CEPHALOSPORIUM ACREMONIUM Corda. On stalks of *Umbelliferæ*, &c. Annan, Aug. 1896, *A. L. S.*

RHINOTRICHUM REPENS Preuss. On a stump. Newport, Oct. 1896, *Mr. Jenkin.*

BOTRYTIS VULGARIS Fr. var. PLEBEJA Fres. On sweet chestnuts. London, Nov. 1896, *A. L. S.*

ACROSTALAGMUS CINNABARINUS Corda. On leaves of *Cratægus Oxyacantha*. Bowness, Cumberland, Aug. 1896, *A. L. S.*

*A. ALBUS Preuss. On stalks of *Bryonia dioica* from Cambridge, Nov. 1896, *A. L. S.*

CLONOSTACHYS ARAUCARIA Corda. On stalks of *Cratægus Oxyacantha*. Bowness, Cumberland, Aug. 1896, *A. L. S.*

GONATOBOTRYS SIMPLEX Corda. On stalks of *Bryonia dioica*. Cambridge, Nov. 1896, *A. L. S.*

CEPHALOTHECIUM CANDIDUM Bon. On herbaceous stalks. Annan, Aug. 1896. The plant is tinged with rose-colour; the conidiophores are frequently septate. *A. L. S.*

MUCROSPORIUM SPHÆROCEPHALUM Sacc. On a stump. Newport, Oct. 1896, *Mr. Jenkin.*

*PERICONIA PYCNOSPORA Fres. On dead herbaceous leaves. Annan, Aug. 1896, *A. L. S.*

ACREMONIELLA PALLIDA Cke. & Mass. On dead herbaceous stalks, leaves, &c. Annan, Aug. 1896, *A. L. S.*

STACHYBOTRYS ALTERNANS Bon. On packing-straw from Edinburgh. June, 1896. This plant subsequently covered the moist blotting-paper with a plentiful black growth. *A. L. S.*

INTOXICATION OF HUMBLE-BEES ON CERTAIN CAPITULATE FLOWERS.

By J. LLOYD WILLIAMS.

ON July 18th, 1889, I happened to be botanizing on the Great Orme, Carnarvonshire. The day was very sunny and warm, and large numbers of humble-bees were gathering honey among the flowers of thistles, chicory, and particularly of *Centaurea Scabiosa*. The latter was visited chiefly by neuter *Bombus lapidarius*, and I observed with surprise that many of the insects on alighting became quite inert and helpless. On watching more closely, the following facts were observed. The bee rapidly examined the florets one by one, leaving them immediately if they had no honey, but stopping some little time if honey was found. In the latter case it invariably happened that the insect suddenly turned on its side, and moved the second pair of legs convulsively in the air; some even turned on their backs, or rolled about on the capitula. After a time a few tried to fly away, but their wings seemed powerless to raise them into the air, so that they fell on the ground instead. Most of them, however, dragged themselves over the florets, greedily searching the same ones over and over again for honey.

I shut one of the bees thus affected in a tin box, and after about fifteen minutes opened the box. Close by was a large plant of *Centaurea Scabiosa*, on which were five helpless bees. The one which had been imprisoned flew away with a loud buzzing noise, described a circle in the air about nine feet above the *Centaurea*, pounced down upon one of the flower-heads, and in a few seconds was as incapable as ever. On this day the above experiment was many times repeated with similar results.

On Sept. 8th, about six o'clock in the evening, I was botanizing in a part of South Carnarvonshire where *Centaurea Scabiosa* does not grow. A *Bombus* alighted on *Scabiosa Succisa*, and immediately became helpless. I placed it in my vasculum, putting with it a number of the flower-heads of *Scabiosa*, and opened the box at intervals of fifteen minutes for two hours. During the whole of that time the bee kept dragging itself from one flower to another, greedily searching the florets for honey, and repeatedly examining the same flowers. It took no notice of any attempts to drive it away further than to raise the second pair of legs, moving them aimlessly in the air. In its inability to fly, and its tendency to fall on one side, it behaved exactly like the bees on the Orme. When, however, the box was opened next morning, the bee had gone as far as it could from the flowers; when put back upon them, it flew upon the window; when caught again and prevented from leaving the flowers, it exhibited a most comical appearance of disgust, raising its head and its fore legs as high as it could above the plants, then precipitately hurrying away as soon as released. The greed and avidity shown by the insect the previous evening when persistently keeping its head in the florets, and its helplessness when tumbling about on the flower-heads, were in striking contrast to the dislike and even disgust shown by the same insect the next morning, and its vigorous efforts to fly away from the same flowers.

On Sept. 13th I was again on the Orme. A *Bombus* alighted on *Centaurea nigra*, and in two or three seconds showed the usual symptoms of incapacity. Ultimately it fell down to the ground, but in a few minutes it was able to fly again.

The number of humble-bees observed getting intoxicated on *C. Scabiosa* was so large, and they behaved in a manner so similar to that of those described above, that it would be useless to quote my notes on each individual case observed. In every instance the bees became covered with pollen, and when taken away from the plant they soon recovered so as to be able to fly vigorously, but they alighted again on the first *Centaurea* available.

When these observations were first made, the following seemed to be the most striking facts:—

(1) All the plants whose flowers produced this deleterious effect had capitula, and in the one on which ninety per cent. of the phenomena were observed the heads were very large.

(2) The bees in rolling helplessly over the flower-heads became most effectually covered with pollen.

(3) When the insects rolled off the plant, they soon recovered their power of flight. They then flew to other plants of the same species, greedily searching for the substance that had produced this curious effect upon them. Their whole behaviour showed clearly that this particular honey possessed a strong attraction for them.

(4) During the season mentioned above, the intoxication of humble-bees on *Centaurea* and *Scabiosa* was such a common occurrence as to seem perfectly normal.

There could be no doubt whatever as to the effectiveness of the phenomenon in causing the cross-fertilization of the flowers. Both on account of the large amount of pollen carried on the bodies of the bees, and of the inevitable transfer of much of it to the stigmas, which would be brought about by the rolling and dragging of the insects over the tops of the florets, it might be said that the arrangement was far more effective than many of those recognized as normal.

The natural deduction then seemed to be that particular capitulate flowers were normally cross-fertilized by the agency of insects which were habitually intoxicated by the honey secreted by the florets.

Before publishing any observations on the subject, it seemed desirable to secure a sufficient amount of the deleterious substance for examination, so I determined to wait another season for this purpose. Strange to say, however, five summers passed without my being able to observe an undoubted instance of the phenomenon, and, when it was observed, it was impossible to get the honey in sufficient quantity for examination. My inability to repeat the observation may have been due to want of opportunity: still, had it been as common as it had seemed at first to be, I ought to have seen it over and over again. It is true that towards the close of the season and on cold days it is a very common occurrence to find bees inert and helpless on flowers. When these are disturbed, they raise the second pair of legs by way of protestation in the way described above, but, as I never succeeded in seeing them alighting on the plant and actually becoming incapable of flight, or, on the other hand, regaining their power of flight when removed from the plant, it seems pretty certain that they were either benumbed with cold or suffering from starvation.

On Sept. 3rd, 1893, at two o'clock in the afternoon, I was again botanizing on the Orme. It was exceedingly sunny and warm, and many humble-bees were busily searching the flowers of *Centaurea Scabiosa* for honey. On a large plant of this species there were six helpless bees. I remained here an hour, but failed to observe one of the many bees visiting the plant actually becoming helpless, nor did I see any of the helpless ones recovering so as to be able to fly away. It seems then unlikely that these were intoxicated, and yet on any other hypothesis it is difficult to see why they should congregate on the particular species of plant which had been observed to produce intoxication.

Undoubted instances of intoxication were not seen until the following summer (1894). On Aug. 18th, an exceedingly warm and sunny day, I was at Abersoch, in S. Carnarvonshire. A number of humble-bees were observed showing the usual symptoms of intoxication after visiting the flowers of *Carduus lanceolatus* and of *Centaurea Scabiosa*. By far the largest number, however, were seen on *Carduus nutans*. Several of the intoxicated bees were taken off the flower-heads and imprisoned in small boxes; they were released after intervals of five to fifteen minutes. In every instance they had perfectly regained their power of flight and made their way straight to other plants of *Carduus nutans*.

It may be well to state that all the above observations were carefully entered in a notebook on the spot. I have been told that the hive-bee often gets intoxicated, but I failed to obtain any trustworthy accounts of the phenomenon from those who professed to have seen it. I have also been unable to find any published accounts of it, and this note is written chiefly for the purpose of eliciting further information on the subject.

The following would seem to be a fair summary of the facts and of deductions to be drawn from them:—

(1) That at certain seasons the honey of some capitulate plants contains a deleterious substance which produces an intoxicating effect on the bees visiting the flowers.

(2) That the phenomenon must materially assist in producing cross-fertilization of those flowers.

(3) That this is not a normal arrangement for producing cross-fertilization. It is conceivable, however, that in the course of time the success of the arrangement might cause it to become normal.

It may be suggested that the curious effect of the honey may be due to fermentation consequent on the attack of some fungus. It is highly desirable that the honey should be carefully examined, in order to find the nature of the change and of the agent producing it.

ISLE OF MAN PLANTS.

By W. P. Hiern, M.A.

At the suggestion of some of the foreign botanists who joined last September the Botanical section of the excursion to the island, in connection with the Liverpool Meeting of the British Association, I give a list of the determined plants which were noticed as wild by the party. The advanced period of the season, the stormy, rough, and rainy weather, and the rapid movement of the excursion were all unfavourable for obtaining a good supply of specimens. The determination of the parasitic fungi and of some few other plants has been kindly forwarded by Prof. P. Magnus, of Berlin, who was a very useful member of the party. The leaders were Prof. F. E. Weiss, of Manchester, and the Rev. S. A. P. Kermode, of the Isle of Man; and the program was as follows:—Thursday, Sept. 24th: Mr. Okell's garden near Douglas; by rail to Port Erin. Friday, 25th: drive by the Round Table to Niarbyl Point, Glen Meaye, and Peel, and back by Foxdale to Port Erin. Saturday, 26th: by rail to Castletown and back; walk to Meayll Hill and Chasms, and back to Port Erin. Sunday, 27th: ——. Monday, 28th: by rail to Douglas; drive to Laxey, thence by electric rail part way up Snaefell; drive to Tholt-y-Will, down glen, through Curraghs to Ballamoar, Jurby, and Ballaugh Station; thence by rail to Douglas. As most of the flowering plants are very common, it seems unnecessary to add definite localities for them.

Ranunculus Drouetii F. Schultz (form approaching *R. trichophyllus* Choix).
R. hederaceus L. (forma *hederæfolia*).
R. Flammula L.
R. acris L.
R. repens L.
Papaver hybridum L.
Fumaria confusa Jord.
F. muralis Sond.
Cheiranthus Cheiri L.
Rorippa Nasturtium Rusby (*Nasturtium officinale* Br.).
Cardamine pratensis L.
Sisymbrium officinale Scop.
Brassica Sinapistrum Boiss.
B. alba Boiss.
Cochlearia officinalis L.
Lepidium hirtum Sm.
Bursa pastoris Weber.
Viola palustris L.
V. sylvestris Lam.
V. tricolor L. α. *pratensis.*
,, β. *arvensis.*
Polygala vulgaris L., var. *minutiflora* Gren. & Godr.
Silene maritima With.
Lychnis Flos-cuculi L.
L. dioica L.
Sagina procumbens L.
Stellaria media Cyr.
Cerastium glomeratum Thuill.
C. triviale Link.
Buda marina Dumort.
B. rupestris F. J. Hanb.
Spergula arvensis L.
Malva sylvestris L.
Lavatera arborea L.
Hypericum Androsæmum L.
H. humifusum L.
H. pulchrum L.
H. Elodes Huds.
Acer Pseudo-platanus L.
Geranium molle L.
Erodium moschatum L'Hérit.
E. maritimum L'Hérit.
Oxalis Acetosella L.
Linum catharticum L.
Ulex europæus L.
U. Gallii Planch.
,, var. *humilis* Planch.
Cytisus scoparius Link.
Medicago lupulina L.
Trifolium pratense L.
T. repens L.
T. dubium Sibth. (*T. minus* Sm.).
Lotus corniculatus L.
L. uliginosus Schkuhr.
Vicia hirsuta S. F. Gray.
V. sepium L.
V. sativa L.
Lathyrus pratensis L.
Ornithopus perpusillus L.
Prunus spinosa L.
P. insititia L.
Spiræa Ulmaria L.
Potentilla Anserina L.
P. reptans L.
P. silvestris Neck.
P. Fragariastrum Ehrh.
Rubus Idæus L.
R. pulcherrimus Neumann.
R. corylifolius Sm.

R., (prob.) *Selmeri* Lindeb.
R. ulmifolius Willd.
Rosa spinosissima L.
R. tomentosa Sm.
R. canina L.
Cratægus Oxyacantha L.
Pyrus Aucuparia Ehrh.
P. rotundifolia ? Bechst.
Lythrum Salicaria L.
Epilobium montanum L.
E. tetragonum L.
Sedum anglicum Huds.
Sempervivum tectorum L.
Cotyledon Umbilicus L.
Chrysosplenium oppositifolium L.
Hydrocotyle vulgaris L.
Apium nodiflorum Reichb. f.
Carum Petroselinum Bth. & Hk. f.
Œnanthe crocata L.
Angelica sylvestris L.
Heracleum Sphondylium L.
Daucus Carota L.
D. gummifer Lam.
Conium maculatum L.
Smyrnium Olusatrum L.
Hedera Helix L.
Sambucus nigra L.
Lonicera Periclymenum L.
Sherardia arvensis L.
Galium Aparine L.
G. verum L.
G. saxatile L.
Centranthus ruber DC.
Valeriana sambucifolia Willd.
Scabiosa arvensis L.
S. succisa L.
Petasites officinalis Moench.
P. fragrans Presl.
Tussilago Farfara L.
Bellis perennis L.
Solidago Virgaurea L.
Gnaphalium uliginosum L.
G. sylvaticum L.
Achillea Ptarmica L.
A. Millefolium L.
Matricaria inodora L.
,, *β. salina* Bab.
Chrysanthemum segetum L.
Artemisia vulgaris L.
Senecio vulgaris L.
S. Jacobæa L.
Arctium majus Bernh.
Centaurea nigra L.
Cnicus lanceolatus Willd.
C. arvensis Hoffm.
C. palustris Willd.
Lapsana communis L.
Hypochæris radicata L.
Taraxacum officinale Weber.
Sonchus oleraceus L.
S. asper Hoffm.
S. arvensis L.
Hieracium Pilosella L.
Jasione montana L.
Campanula rotundifolia L.
Calluna Erica DC.
Erica Tetralix L.
E. cinerea L.
Vaccinium Myrtillus L.
Ilex Aquifolium L.
Ligustrum vulgare L.
Fraxinus excelsior L.
Volvulus sepium Junger.
Myosotis cæspitosa F. Schultz.
M. arvensis (Lehm.) Lam.
Solanum Dulcamara L.
Digitalis purpurea L.
Linaria vulgaris Mill.
Scrophularia nodosa L.
Pedicularis sylvatica L.
Euphrasia officinalis L.
Bartsia Odontites Huds.
Veronica Beccabunga L.
V. Chamædrys L.
V. serpyllifolia L.
V. agrestis L.
V. polita Fries.
V. Tournefortii Gmel.
Mentha aquatica L.
Thymus Serpyllum Fr.
Prunella vulgaris L.
Nepeta Glechoma Benth.
Lamium purpureum L.
Galeopsis Tetrahit L.
Stachys palustris L.
S. arvensis L.
Teucrium Scorodonia L.
Primula acaulis L.
Lysimachia nemorum L.
Glaux maritima L.
Anagallis arvensis L.
A. tenella L.

Samolus Valerandi L.
Armeria maritima Willd.
Plantago Coronopus L.
P. maritima L.
P. lanceolata L.
P. major L.
Chenopodium album L.
C. rubrum L.
Beta maritima L.
Atriplex patula L., c. *angustifolia* (Sm.).
A. deltoidea Bab., *β. salina* Bab.
Rumex obtusifolius L.
R. Acetosa L.
R. Acetosella L.
Polygonum Persicaria L.
P. aviculare L.
Euphorbia Helioscopia L.
E. Peplus L.
Callitriche verna L.
Urtica urens L.
U. dioica L.
Humulus Lupulus L.
Ulmus montana Stokes.
Salix fragilis L.
S. alba L.
S. purpurea L. (cult.).
S. Smithiana Willd. (cult.).
S. cinerea L.
S. Caprea L.
Betula alba L.
Alnus glutinosa Medik.
Fagus sylvatica L.
Castanea sativa Mill.
Quercus Robur L.
Corylus Avellana L.
Iris Pseudacorus L.
Alisma Plantago L.
A. ranunculoides L.
Scilla festalis Salisb.
Narthecium Ossifragum Huds.
Juncus maritimus Lam.
J. effusus L.
J. conglomeratus L.
J. acutiflorus Ehrh.
J. lampocarpus Ehrh.
J. squarrosus L.
J. bufonius L.
Luzula maxima DC.
Sparganium minimum Fr.
Arum maculatum L.
Lemna minor L.
Potamogeton polygonifolius Pour.
P. pectinatus L.
Scirpus lacustris L.
S. cernuus Vahl, *Enum.* ii. 245 (1806); *S. Savii* Sebast. & Mauri, *Fl. Rom. Prodr.* 22 (1818), var. *monostachys* Syme.
Isolepis pygmæa Kunth.
Eriophorum polystachyum L.
Carex flacca Schreb.
Phalaris canariensis L.
Nardus stricta L.
Phragmites communis Trin.
Agrostis vulgaris With.
A. alba L.
Holcus lanatus L.
H. mollis L.
Aira caryophyllea L.
A. præcox L.
Arrhenatherum avenaceum P. Beauv., *β. A. bulbosum* Lindl. b. *nodosum* Reichb.
Sieglingia decumbens Bernh.
Cynosurus cristatus L.
Poa annua L.
P. pratensis L.
Dactylis glomerata L.
Festuca ovina L.
Serrafalcus racemosus Parl.
Brachypodium sylvaticum Beauv. *Agrost.* 101.
Triticum repens L.
Lolium perenne L.
Equisetum arvense L.
E. limosum L.
Polypodium vulgare L.
Lastræa Filix-mas Presl.
L. dilatata Presl.
Athyrium Filix-fœmina Roth.
Lomaria Spicant Desv.
Pteris aquilina L.
Riccia glauca L.
Ascophyllum nodosum Le Jolis.
Pellia epiphylla Corda.
P. calycina Nees.
Fegatella conica Corda.
Marchantia polymorpha L.

Puccinia Malvacearum Mont. On *Malva sylvestris*, Rushen and Castletown.

P. Umbilici Guép. On *Cotyledon Umbilicus*, Rushen.

P. Taraxaci Plowr. On *Taraxacum officinale*, Port Erin.

P. Centaureæ Plowr. On *Centaurea nigra*, Port Erin.

P. Hieracii Mart. On *Hypochæris radicata*, neighbourhood of Port Erin.

P. Smyrnii Corda. The æcidium on *Smyrnium Olusatrum*, Glen Meaye.

P. Cirsii-lanceolati Schroet. On *Cnicus lanceolatus*, Rushen.

P. obscura Schroet. On *Luzula maxima*, Glen Meaye.

P. Rubigo-vera (DC.). Wint. On *Triticum repens*, Castletown.

P. poarum Nielsen. On *Poa*, Port Erin; the æcidium (*Æcidium Tussilaginis* Gmel.) on *Tussilago Farfara*, Port Erin.

Phragmidium violaceum (Schultz) Wint. (syn. *P. asperum* Wallr.). On *Rubus* sp., Port Erin.

P. effusum Auersw. On *Rubus Idæus*, Sulby Glen.

Coleosporium Sonchi (Pers.) Wint. On *Sonchus arvensis*, Ballamore.

C. Tussilaginis (Pers.) Kalchbr. On *Tussilago Farfara*, Castletown.

C. Senecionis (Pers.) Fr. On *Senecio vulgaris*, Castletown.

C. Synantherarum Fr. On *Petasites*, Ballamore.

C. Euphrasiæ (Schum.) Wint. On *Euphrasia officinalis*, Round Table.

Melampsora Euphorbiæ Cast. On *Euphorbia Peplus*, Castletown.

Uredo hypericorum DC. On *Hypericum Androsæmum*, Douglas.

Exoascus betulinus (Rostr.) P. Magn. Had formed numerous "Hexenbesen" (witches' brooms) on a Birch near Douglas.

Podosphæra Oxyacanthæ (DC.) De Bary. On *Cratægus Oxyacantha*, Foxdale.

Ovularia obliqua (Cooke) Oudem. On *Rumex obtusifolius*, Rushen.

Ramularia sambucina Sacc. On *Sambucus nigra*, Ballamore.

R. gibba Fuckel. On *Ranunculus repens*, Port Erin.

Cladosporium graminum Corda. On *Triticum repens*, Castletown.

Septoria Rubi Westand. On *Rubus* sp., Port Erin.

Phyllosticta maculiformis Sacc. On *Castanea sativa*, Glen Meaye.

Darluca Filum Cast. In *Puccinia Rubigo-vera* (DC.) Wint. on *Triticum repens*, Castletown; and in *P. obscura* Schroet. on *Luzula maxima*, Glen Meaye.

Placosphæria graminis Sacc. & Roum. On *Holcus mollis*, Sulby Glen.

Marsonia Potentillæ (Desm.) Fisch. On *Potentilla Anserina*, neighbourhood of Port Erin.

Cladonia rangiferina Hoffm. Round Table.

Ramalina cuspidata (Ach.). Fleshwick Bay and Round Table.

THUIDIUM PHILIBERTI Limpr., A NEW BRITISH MOSS.

By H. N. Dixon, M.A., F.L.S.

In a note on *Thuidium recognitum* Lindb. in the recently published *Student's Handbook of British Mosses*, p. 386, I referred to *Thuidium intermedium* Phil. (= *T. Philiberti* Limpr.) as of doubtful specific status, and probably equivalent to *T. recognitum.* This conclusion was based upon the full description of the plant by Philibert in the *Revue Bryologique*, 1893, p. 33, the only source of information I then possessed. I have recently, however, received from Dr. G. N. Best, of Rosemont, New Jersey, his *Revision of the North American Thuidiums*, and by the kindness of the same bryologist an authentic fruiting specimen of the moss in question; and a study of the plant, together with the fresh light thrown upon it by Dr. Best's description, has shown that Philibert's account is somewhat inadequate, and has induced me to alter my opinion and to recognise in *T. Philiberti* at least as good a right to specific status as in the case of *T. delicatulum* Mitt. and *T. recognitum* Lindb.

Having once grasped the salient points of *T. Philiberti*, I had little hesitation in referring to it a moss which I gathered on wet rocks near the summit of Craig Chailleach, Perthshire, in 1893. The plant, however, was without fruit, and bore only a few young perichætia, some of the more important distinguishing characters being for this reason unavailable. I sent a specimen therefore to Dr. Best, and his reply is as follows:—"Your *Thuidium* is indeed *T. Philiberti.* I congratulate you on being the first to find it in Scotland. Now that you know what it is, you will probably not be long in finding it in England. It always grows in wet places, and is usually sterile. As to its rank, I have to say that the more I study it the more I am satisfied that it is a good species."

As the moss has not been described in any of the systematic works most in use, and the original description by Philibert is diffuse and fails to point out or at any rate to lay stress upon some of the leading characters (and in one point at least is slightly inaccurate), I here subjoin Dr. Best's diagnosis of the species, extracted from the *Bulletin of the Torrey Bot. Club*, xxiii. 84 (1896).

Thuidium Philiberti Limpr.

Thuidium intermedium Philib. *Rev. Bryol.* xx. 33; 1893. Not Mitt. 1851. *T. Philiberti* Limpr. in *Rabenh. Kryptog.* iv. 2, 835; 1895. Medium-sized plants, yellow to dark green, in intricate mats; stem 4–8 cm. long, creeping, pinnately branched; branches pinnate or bipinnate: paraphyllia multiform; stem-leaves triangular-cordate-acuminate, usually with a *hyaline filiform* point, margins revolute or recurved, at least below; leaf-cells oblong-quadrate to oblong-rhomboidal. Dioicous; perichætial bracts loose, *flexuous spreading* or reflexed, serrate, rarely with a few short cilia on the innermost, acumen about *three* times as long as the short, scarcely costate body; capsule oblong-cylindrical, curved, horizontal; annulus *narrow, indistinct*, tardily or imperfectly deciduous; operculum conic-rostrate, curved; spores ·012–·016 mm., almost smooth, maturing in October. (Plate 260.)

In wet swampy places on the ground or the base of small trees. New Jersey (*Best*); Pennsylvania (*Porter*).

Dr. Best remarks that it is probably an involute form of *T. delicatulum* Mitt. I think, however, it may be doubted whether its relationship to *T. recognitum* Lindb. is not at least as close.

It may be as well to point out that the re-naming of the species by Limpricht was necessitated by the fact that the name *T. intermedium* was already preoccupied by a species of Mitten's.

Like most of its allies, *Thuidium Philiberti* is usually found barren; it will therefore be helpful to indicate the characters by which, even without fruit, it may be recognised from *T. delicatulum* and *T. recognitum*, the only two British species with which it could be confused. (The simply acute apical cell of the branch-leaves of *T. tamariscinum* at once separates that species.) In the branching it is somewhat intermediate between the two, being frequently tripinnate, though less regularly and distinctly so than in *T. delicatulum.* It also grows in more or less damp situations, whereas *T. recognitum* is usually found on dry calcareous soil.

But the most characteristic feature, and the one that to my thinking gives it one of its best claims to distinction, is the long-drawn-out, filiform point of the stem-leaves, forming a fine hyaline jointed hair composed of a single row of linear cells, and of some considerable length. In the older leaves it is often broken off, but otherwise it is probably always present, and is especially noticeable in the tuft of leaves at the apex of a growing stem or new shoot. In this character the plant shows an approach to some exotic species, such as *T. cymbifolium* Dozy & Molk.

The stem-leaves in *T. recognitum*, more rarely in *T. delicatulum*, are occasionally tipped with a short point of a similar nature; but it rarely consists of even two or three cells in length, and is never prolonged into a long flexuose hair-point, as in *T. Philiberti*. *T. delicatulum* differs from both the other species in the stem-leaves more erect and less spreading, indeed when dry appressed to the stem with the point scarcely showing; in *T. recognitum* and *T. Philiberti* they are, on the other hand, widely spreading when moist, and even when dry the long acumen is frequently recurved, and always forms a much more distinct feature than in *T. delicatulum*, which in this respect resembles *T. tamariscinum*. The long spreading acumen is indeed quite enough to separate the two former species from these two, with the lens alone; the difference being most marked when the plant is dry.

T. Philiberti has only been figured (and there not quite satisfactorily) by Dr. Best in the publication referred to. It has been found in several localities in France and Switzerland, as well as in the localities in the U.S.A. mentioned above, where it was independently distinguished by Dr. Best. I have not heard of its occurrence elsewhere, but it is not unlikely that it will be found more or less widely distributed now that attention has been called to its distinguishing characters.

BROMUS INTERRUPTUS Druce.

As was mentioned in our last number, Mr. G. C. Druce has published in the *Journal of the Linnean Society* (xxxii. 426–30) a full account of this new grass, of which we printed a brief diagnosis in this Journal for 1895 (p. 344). As was there stated, the plant had been published in the Report of the Botanical Exchange Club for 1888 (not 1880 as printed) as *B. mollis* var. *interruptus* Hackel, but the following note, which Mr. Druce has kindly sent us, supplementing his Linnean paper, shows that it had previously attracted attention as a British plant. Mr. Druce writes:—

"I have found a specimen in the Watson Herbarium at Kew labelled *B. mollis* var. *pseudo-velutinus*, dated 1849, which was commented on by Mr. Watson in *Phytologist*, iii. p. 807 (1850), as follows:—'*B. pseudo-velutinus.* This is sent by Miss Barnard, from a field at Odsey, in Hertfordshire (or Cambridgeshire?). It much resembles that usually dwarf and littoral state of *B. mollis* which has been erroneously called *B. velutinus* by several British botanists. These inland specimens have culms fully four times as tall as the shore plant, and the pubescence of the glumes or pales is shorter. They are, indeed, simply examples of *B. mollis*, with the pedicels and spikelets much shortened, and the panicle rendered more close and compact. The specimen from Odsey, which I at once recognized as *B. interruptus* from the panicle, was found when examined to have the split palea; so that we now know that it is not a very recent introduction to Britain. Professor Häckel assents to my giving it specific rank.'"

The full description of the plant, as given in the Linnean Society's Journal, runs thus:—

"Herba annua, biennis aut perennis, sæpius perennis. Spiculæ in pedicellis brevibus rigidis singillatim (alternatim dextrorsum et sinistrorsum) in rhachide dispositæ; singuli pedicelli cum 3–5 sessilibus aut subsessilibus spiculis apice pedicelli racemosim dispositi. Panicula, florem et fructum gerens, erecta angusta evidenter *interrupta.* Spiculæ, florem et fructum gerentes, erectæ primum ovali-lanceolatæ acutæ; proventu ovales et obtusæ cum 6–12 floribus glauco-viridis pubescentes. Gluma interior et vacua dimidia non supra in partem sexti floris (tertii floris in eodem latere) producta. Glumæ, florem et fructum gerentes, arcte imbricatæ. Palea inferior exterior marginibus dimidiâ parte inter mediam paleam et apicem utroque latere obtuse angulata, 5–7-costata; apice nonnihil emarginata, pubescens aut subglabra marginibus late scariosis. Arista ex una emarginatione inferioris paleæ precedens, fere directa aut erecta, paleâ nonnihil brevior. *Palea superior interior* (*gluma florens superior*) *pæne ad basin in binas angustas lanceolatas partes paleâ inferiore vel exteriore dimidia parte aut duabus partibus minus longas, divisa.*"

Mr. Druce adds:—

"The most striking feature of this plant when first seen is the inflorescence, which differs from all other species of *Bromus* known to me, in that single short stiff pedicels arise, alternately right and left of the main rachis, each bearing at its extremity 3–5 sessile (or in some cases shortly stalked) spikelets. To this fact is due the peculiar and strikingly interrupted and compact appearance of the whole inflorescence, which is made up of two rows of clustered groups of 3–5 spikelets. This peculiar feature does not obtain in its nearest allies, since in them 4–5 slender pedicels of various lengths arise at the same level on the rachis, each bearing one or two, rarely more, spikelets; hence the inflorescence in these species is more loosely continuous. As will be seen, the alliance of *B. interruptus* is essentially with *B. mollis*, since the larger or inner glume extends half way to the apex of the sixth floret (the third on the same side), whereas in *B. racemosus* and *B. commutatus* it reaches only to the fourth flower (the second on the same side). The texture and pubescence too of the spikelets of *B. interruptus* are similar to those of *B. mollis*. The character which at once separates *B. interruptus* from *B. mollis*, *B. commutatus*, *B. racemosus*, &c., is to be found in the upper pale (the inner palea of Parnell), *which is uniformly split to the base*, and is much shorter than the outer or lower pale."

The split palea cannot, as may be suggested, proceed from an accidental rupture during the growth of the fruit, as examination shows that the pales are split from the early flowering stage. The following note, added by Mr. C. B. Clarke to Mr. Druce's paper as printed by the Linnean Society, shows that this character is of exceptional interest:—

"In all the examples of *B. interruptus* Druce, the upper pale is, even in the young flower, divided to the base or at least $\frac{15}{16}$ths of its length into two subequal lanceolar lobes; each of these has the green nerve down its middle (not exactly median), and the two lobes stand soon rather divaricately apart. There is nothing in any other species of *Bromus* approaching this; and no such complete division of the upper pale is well established in the whole order. Dr. Stapf has lately examined into the few alleged cases of the occurrence of a split upper pale in grasses; and he cannot find in verifying these any case parallel to that of *Bromus interruptus;* the split is either only partial, hardly half-way down, or it is mechanical, *i.e.* does not exist in the young flower. . . .

"Dr. Stapf argued, when Mr. Druce's paper was read, that *Bromus interruptus* Druce must be treated as a monstrosity and could in no case be made a new species. It may indeed be maintained that the character of the completely bifid upper pale is either generic or monstrous, one or the other, and cannot be specific. The remarkable uniformity with which the upper pale is split to the base in every flower, in every specimen yet got from diverse localities, may be held to negative for the present the view that *B. interruptus* is a monstrosity. Of all the innumerable species proposed as split-offs from *Bromus mollis*, there is no one so well worth a specific name as *B. interruptus* Druce, and no one to be compared with it in morphologic interest."

Bromus interruptus was first found by Mr. Druce in Berkshire in

1888, and he has since seen numerous specimens from Oxfordshire, Buckinghamshire, W. Kent, and Norfolk. Mr. Tufnail says he has found it rather plentiful near Lowestoft, in Suffolk, and that he has seen specimens from Lincolnshire. It will probably prove to be not uncommon, now that its characters have been pointed out. Mr. Druce has had the plant under observation for seven years, and finds that it comes true from seed.

BIBLIOGRAPHICAL NOTES.

XIV.—Swartz's 'Prodromus Descriptionum Vegetabilium.'

An interesting relation exists between the book which is the subject of this note and the herbarium in the Department of Botany of the British Museum. As this relation may not be generally known, and as it also explains certain citations which would otherwise be hard to understand, it may be worth while putting it on record. The title-page of the work reads as follows:—"Nova genera et species plantarum seu Prodromus descriptionum vegetabilium, maximam partem incognitorum quæ sub itinere in Indiam occidentalem annis 1783–87 digessit Olof Swartz M.D." The book was published at Stockholm, Upsala and Abo, in 1788. It must not be inferred from the title that Swartz was in the West Indies till 1787. He himself says in his Preface, "Angliam repetebam Anno 1786," and goes on to refer to the great kindness he received, during his stay in London, from Sir Joseph Banks, "qui nec ipse suam mihi denegabat benevolentiam, quin suis me consiliis, sua inspectione juvare dignaretur." In Banks's collections he found a number of plants which had previously been brought to England, "ibique statim a def. Doct. Solandro descripta, et eorum exempla in Museum illata." Among these plants, Swartz goes on to say, he found one or two new genera, which he has indicated by an asterisk in his own list. One of these, *Hepetis*, runs the genus *Pitcairnia* of L'Héritier very close indeed, and it seems an open question as to which has priority.

Pitcairnia was published in the *Sertum Anglicum*, which, like Swartz's *Prodromus*, bears the date 1788 on the title-page. L'Héritier's preface is dated from Paris, April 20th, 1788. In view of this proximity of dates, it is interesting to note the opinion of writers more or less contemporary. Schreber (*Gen. Pl.* no. 1741) in 1791 keeps up *Hepetis*, and cites *Pitcairnia* as a synonym on the authority of Swartz himself. But in the *Flora Ind. Occid.* (i. 578), published in 1797, we find Swartz preferring *Pitcairnia* and reducing his own genus *Hepetis*, and this practice has been generally followed, though remarks by certain writers lead one to suspect that priority may not have been the reason. Thus Redouté (*Liliacées*, vol. ii., before tab. 73) says:—"Ce genre a été dédié par L'Héritier à un Anglais (Williams Pitcairn), amateur de la Botanique, et dans le jardin duquel la première espèce connue a été observée; il avait déjà été nommé *Hepetis* par Swartz et Solander: L'Héritier lui-même le désignait dans ses manuscrits sous le nom de *Spirastigma*, qui indique son principal caractère; mais le nom de *Pitcairnia* à prévalu, et a été adopté par Swartz lui-même, qui aurait pu réclamer la priorité"; and in Rees's *Cyclopædia* (1819), under *Pitcairnia*, we read: "The name of *Hepetis*, appropriated by Swartz, from Solander's manuscripts, to the same genus, has by common consent been given up, in favour of the claims of so eminent a benefactor to botany as Dr. Pitcairn." Besides *Hepetis*, nine other genera are indicated as found in the Banksian herbarium. Three of them, *Xiphidium* Loefl., *Ruyschia* Jacq., and *Apeiba* Aubl., were already in existence, and are among the few genera of other authors to which reference is made in the preface as "nova genera necdum Systemati Vegetabilium inserta," which Swartz determined afresh, and carefully examined and described.

Sloane's Jamaica plants supplied him with many novelties. Thus, out of nineteen species of *Panicum*, we are referred for no less than six to the *History of Jamaica*, while two are based on Patrick Browne's work. In three cases, namely, *Panicum pilosum*, *P. diffusum*, and *P. oryzoides*, no mention of the plant cited by Swartz will be found in Sloane's *History*, the references being to MS. notes at the bottom of the given page in Sloane's own copy in the Department of Botany at the British Museum. In each case there is a marginal reference to the volume and folio in the Sloane herbarium, wherein the plant is duly labelled by Sloane himself.

A. B. Rendle.

SHORT NOTES.

Hymenophyllum tunbridgense Sm. in the South Ebudes, v.-c. 102.—I am pleased to be able to furnish confirmation of the old doubted record of this fern from the South Inner Hebrides (Islay, Jura, &c.). On October 21st I received from Dr. T. F. Gilmour, of Port Ellen, fresh fruiting specimens gathered by him in the Kildalton Woods, Islay. These have been submitted to Mr. Arthur Bennett, who states that this confirmation raises to twenty-nine the number of vice-counties in which the plant is known to grow. We have now authentic record of the occurrence of this fern in the following seven vice-counties on the West Coast of Scotland, *viz.* (76) Renfrew; (97) Westerness; (98) Argyle, Main; (99) Dumbarton; (100) Clyde Isles; (102) South Ebudes; and (103) Mid-Ebudes; besides in (86) Stirling, an inland county. —A. Somerville.

E. Suffolk Charas.—In June last we collected a *Chara* in two places near Southwold, which Messrs. Groves identified as *C. canescens* Loisel. This plant has hitherto been recorded only from Cornwall and Dorset, and from Ireland; so its occurrence in Norfolk very considerably extends its range. The plants bore nucules in both stations, and in one were greyish and incrusted, but green and unincrusted in the other. *C. contraria* Kuetz., which grew with it in one place, has been recorded from West, but not from East Suffolk before. Messrs. Groves also named this.—E. S. & C. E. Salmon.

New Dorset Station for Erica ciliaris L. — In the case of so rare a plant, hitherto only recorded for E. and W. Cornwall and Dorset in Britain, and in Dorset restricted to the heaths south of Wareham, it may be worth reporting its occurrence in the parish of Parkstone, on the *east* side of Poole Harbour. Extending over about an acre of bog in profuse quantity, it is clearly not a recent introduction; more probably a relic of the ancient flora. The marvel that so conspicuous a plant in no very out-of-the-way spot has been so long overlooked is, I think, explained in a way suggested to me by Dr. A. R. Wallace; namely, that it occupied an impervious part of the morass, only recently made accessible by a new cut of a local Waterworks Company. With the species grows a fair amount of *E. ciliaris* × *Tetralix* (*E. Watsoni* Benth.), which was blooming freely in October, after *E. ciliaris* had gone over. This is now the easternmost station for the species, being within about a mile and a quarter of the Hants border.—Edward F. Linton.

Varieties of Hypochœris glabra L. (*Journ. Bot.* 1896, 510).—With respect to Mr. Bennett's note, I may remark that I also have in my herbarium a small plant of *Hypochœris glabra* L., labelled "Sandy field E. of Rillington, S.E. Yorks. G. Webster, 1892." This agrees well with the description given of the var. *vulgaris* in Mr. Bennett's note. If Mr. Bennett's plants were gathered in the same locality as my own, possibly both the ordinary typical specimens of *H. glabra* and var. *erostris* may occur in close proximity, or at any rate in neighbouring stations.—A. B. Jackson.

Hypochœris glabra var. — The words "destitute of woolly hairs" were applied by me (*Journ. Bot.* 1896, 476) to the pappi of a var. of *Hypochœris glabra*, L., and the implied character was used in classifying forms with erostrate achenes. Mr. Arthur Bennett (p. 510) takes exception to the phrase, assuming it to mean an absence also of the usual plumose hairs characteristic of the genus. A similar expression has been used by Poiret, Petermann, and others, in dealing with segregates of the species, and appeared to me sufficient to convey my meaning to anyone acquainted with these forms. The misunderstanding is the more to be regretted because it detracts from the value of Mr. Bennett's criticism of a classification of forms based on that character. The interesting E. Yorkshire specimens, for instance, which have some pappi plumose, some pilose (the hairs being deciduous), need not "represent two varieties on one plant" if the classification be taken literally.—S. T. Dunn.

Lathyrus Boissieri (*Journ. Bot.* 1896, 484). — This name, which Messrs. Autran and Durand propose for *Orobus grandiflorus* Boiss., is anticipated in my paper "Ueber einige Orobus-Arten und ihre geographische Verbreitung." The synonymy of the plant is therefore:— LATHYRUS LIBANI Fritsch in Situngsber. d. Wiener Akad. d. Wiss. civ. p. 517 (1895). *Orobus grandiflorus* Boissier, Flora Orientalis, ii. p. 622 (1872), non *Lathyrus grandiflorus* Sibth. et Sm. (1813). *Lathyrus Boissieri* Autran et Durand, Hortus Boissierianus, p. 73 (1896).—KARL FRITSCH.

NOTICES OF BOOKS.

THE WELWITSCH HERBARIUM.

Catalogue of the African Plants collected by Dr. Friedrich Welwitsch in 1853–61. Dicotyledons, Part I. [Ranunculaceæ—Rhizophoraceæ]. By WILLIAM PHILIP HIERN, M.A., F.L.S. London: British Museum (Natural History); Dulau & Co, 1896. 8vo, pp. xxvi, 336. Price 7s. 6d.

IT is more than twenty years ago since the plants enumerated in this Catalogue were the subject of proceedings in the English law-courts. Dr. Welwitsch bequeathed the first, or "study," set of his collections to the British Museum, and his bequest was disputed by the Portuguese Government, whose servant he had been, and who claimed possession of all his collections. The executors—Mr. Carruthers, then Keeper of the Department of Botany in the British Museum, and Mr. F. Justen—resisted this demand at their own personal risk. The suit resulted in a compromise, by which it was agreed that the Portuguese Government should be considered as entitled to the collections, on the understanding that they would give to the British Museum the best set, next after the study set, of the botanical specimens and other objects of natural history, with a copy of all Welwitsch's notes and descriptions, the Museum contributing to the costs of separation and transcription. The work of separation was entrusted to Mr. Hiern, and it was arranged that he should prepare a catalogue of the botanical descriptions. Shortly after this, however, Mr. Hiern left London, and although he made some progress towards the proposed enumeration, the matter for the time fell through. Fortunately, however, and very appropriately considering his connection with the acquisition of the collections, Mr. Carruthers, shortly before his retirement from the Museum, was able to induce Mr. Hiern to resume his work, and we have now before us the first instalment of the Catalogue of Welwitsch's African plants.

This brief summary of what took place is practically identical with the short preface which Mr. Murray has prefixed to the volume, and is a sufficient record of what took place. Those who desire further details of this botanical *cause célèbre* will find them in this Journal for 1875, pp. 380–2. Future botanical historians will find it worth their while to consult the affidavits made by various eminent botanists upon points connected with the case; the extracts from these which we were enabled to give in an article "Dr. Seemann's Study-set" (*Journ. Bot.* 1889, pp. 102–5) are sufficient to show that much of interest may be gleaned from these depositions.

Of the set of specimens thus obtained for the National Herbarium it is impossible to speak too highly. Many good collectors are not botanists; certainly many botanists are very bad collectors: but Welwitsch combined in himself the qualifications of each, to an extent which is rare, if not unique. From his abundant and well-selected material it was possible to carry out with the most satisfactory results the arrangement that the British Museum series should correspond as nearly as possible with the study set; and the former remains absolutely intact, while the latter has, we believe, to some extent been distributed to various herbaria. London is more readily accessible than Lisbon, and as the British Museum set is the basis of the Catalogue now begun, it is practically the standard collection of Welwitsch's plants. Judging from monographs in which Welwitsch's collections are cited, the distributed sets are (as was necessarily the case) very incomplete, while if the plants now at Kew may be taken as a sample, the material sent out has been but meagre.

There is no need to enlarge on Mr. Hiern's numerous qualifications for the task he has undertaken. In former years he worked assiduously at African botany; the third volume (and the most recent, although published twenty years since) of the *Flora of Tropical Africa* was mainly from his pen. He is, as every one who has seen his work knows, painstaking and logical to a fault, thorough and accurate in all his researches, whether botanical or bibliographical. In this latter particular this Catalogue will come as a shock to those whose nomenclature is regulated by (supposed) "convenience," for Mr. Hiern—a firm believer in that form of priority which recognizes as the right name for a plant that under which it has been described in the genus in which it is retained—has rigidly carried out his principles, with, it must be allowed, somewhat startling results. He has followed—sometimes at a safe distance—Dr. Otto Kuntze's *Revisio Generum*, and it must be confessed that the result is to confirm the opinion, already expressed in these pages, that the *Revisio* contains excellent work which cannot be ignored by systematists. Mr. Hiern, in adopting Dr. Kuntze's nomenclature, has carefully tested it in every instance; in some cases—for example, as the adoption of names published prior to 1753, and in a certain indifference to niceties of spelling—he (we think properly) declines to follow him. Probably no systematist—certainly no English systematist—has hitherto taken Dr. Kuntze so seriously and tested his work so thoroughly; and it will be interesting to see how the bringing of this revolution to our own doors will be received by English-speaking botanists.

Even the most hardened followers of the laws of priority will feel a pang of regret at the disappearance of *Welwitschia* in favour of Welwitsch's earlier name *Tumboa;* while *Camoensia* is in many respects preferable to *Giganthemum*, which has six years' priority. *Maximilianea* Mart. (1819) for *Cochlospermum* Kunth (1822); *Calceolaria* Lœfling (1758) for *Ionidium* Vent. (1803); *Rinorea*

Aubl. (1775) for *Alsodeia* Thouars (1807); *Damapana* Adans. (1763) for *Smithia* Ait. (1789); *Coluteastrum* Heistr. ex Fabric. (1763) for *Lessertia* DC. (1802); *Cacara* Thouars (1806) for *Pachyrhizus* Rich. (1825); *Botor* Adans. (1763) for *Psophocarpus* Neck. (1790)—are samples of the substitutions which will provoke the advocates of "convenience" to use strong language: occasionally, indeed, it must be owned that there seems some excuse for the plea, if any but a logical course were followed—as when *Dolicholus* Medik (which is certain to be confused with *Dolichos*) replaces *Rhynchosia*, which it antedates by three years. To such alterations in spelling as *Cajan* and *Sesban* for what have been more recently known as *Cajanus* and *Sesbania* we shall soon become accustomed, just as British botanists have come to accept the return to *Arenaria trinervia* in the name which Smith altered to *trinervis* (the latter form does not even appear in Jackson's *Index*). Those who would criticize Mr. Hiern's action will find the best opportunity for doing so in *Crassuvia*, which is substituted for *Bryophyllum;* in this instance alone, as it seems to us, he has "strained principles until they are in danger of snapping."

As a result of following Dr. Kuntze, the initials "O. K." are appended to a vast number of species, for that author, encroaching as it seems to us on the province of the monographer, took to himself all the species contained in the genera which he superseded, without that careful examination which alone can justify such wholesale transference. In some genera, however, Dr. Kuntze missed certain species which are first allocated there by Mr. Hiern, and of course take his name; while others—*Dolicholus*, for instance—are here for the first time restored.

But something must be said about the plants themselves. It is evidence of what has been said earlier in this notice that so many new species yet remained to be described: this occurs mainly, though by no means entirely, in the orders for which Welwitsch did not lend his material to the authors of the *Flora of Tropical Africa*. There is one new genus—*Epinetrum*, in *Menispermaceæ*, of which only the male plant is known, so that its position in the order is doubtful. Only the novelties are fully described, but to almost every species are added the copious notes which Welwitsch attached to his specimens—notes which testify as forcibly as the plants themselves to the extraordinary care and labour which he bestowed upon his collections. It may be said that these, and the very minute descriptions of the localities, might have been further condensed; but they contain noteworthy remarks, and it would not have been easy to decide what to omit. Many of the orders are preceded by an interesting summary by Welwitsch, dealing with the general appearance of the plants, their position in the local flora, their characteristics, uses, names, and the like. Mr. Hiern has carefully embodied with the MS. notes those published by Welwitsch in the *Apontamentos* and the *Synopse;* he has quoted every number, not only of the herbarium, but of the supplementary carpological collection. A complete bibliography of the species would have been out of place; but Mr. Hiern has cited for each the place of original publication, with date; the *Flora of Tropical Africa*, so far as the plants are included therein; and any book or paper in which Welwitsch's specimens are especially mentioned.

The Catalogue is preceded by certain introductory matter, including a biography of Welwitsch, mainly derived from that published in this Journal for 1871, pp. 1–11; a note on the divisions of Angola; and a very complete bibliography, in which are enumerated Welwitsch's own writings, and other publications devoted to special parts of his collections. There is also an excellent portrait, taken, like that which formed the frontispiece to this Journal for 1871, from a photograph executed in August, 1865.

We have only to express a hope that the remainder of this valuable contribution to our knowledge of the African flora may be concluded at as early a date as possible. Mr. Hiern will complete the Dicotyledons; Mr. Rendle has undertaken the Monocotyledons; Dr. Stephani will describe the Hepaticæ; Mr. W. West begins in this number of the Journal the description of the Freshwater Algæ; and the remaining groups will be undertaken by the staff of the Department of Botany. It may be hoped that the blight which has for so many years hindered the continuation of the African floras for which Kew is responsible will not descend upon this important undertaking, for which botanists have to thank the Trustees of the British Museum.

An Introduction to Structural Botany. Part II.—Flowerless Plants. By D. H. Scott, M.A., F.R.S. London: A. & C. Black. 1896. Pp. xv, 312; figs. 114. Price 3s. 6d.

The first part of this book was welcomed in these pages as a companion volume to Mr. Oliver's *Lessons*, and it would have been hard to find a heartier form of welcome. Students and teachers of Botany will be equally grateful for this part. It was more needed than the other, and the subject is much harder, and perhaps the gratitude should therefore be greater—but, on the other hand, it is not quite such a good book. How could it be? The subject of Part I. lent itself to simplicity of treatment; the subject of Part II. lends itself to all manner of pitfalls, to a choice of types and treatment that would bewilder anybody. Dr. Scott has guided himself through a very tortuous channel in a masterly way, and, even apart from the botanical merit, has given us an excellent elementary Cryptogamic Botany. One is tempted to regret that it is, as it professes to be, purely structural. All that is wanted to make it delightful reading is a judicious mixture with it of the general natural history of Cryptogams. But this is not fault-finding—it is mere sighing after another ideal.

To give an idea of the scope of this book it may be recalled that Part I. had three types; Part II. begins with Type IV. and finishes with Type XXVI. It is all done with the accuracy and lucidity Dr. Scott has led us to expect in his expositions, and teachers and students may safely work with it as a bed-rock of sure stability. For some of the types one might have chosen others, perhaps with advantage—e. g. *Œdogonium*—since this is an elementary work seeking after simplicity; but it cannot be denied the author uses *Œdogonium* well. There are a few minor faults or rather omissions that might have been supplied in revision. For example, the citation of authorities. *Selaginella Kraussiana* A. Br. has a footnote explaining that A. Br. is Alexander Braun, the authority for the name. But subsequent types—e. g. *Pellia epiphylla* and *Funaria hygrometrica*—have neither authority nor footnote. They have a grievance like that of the "poor tiger that had not got a Christian" in the picture.

Those of us who had been loyal or obstinate (any other adjective of the kind will do) on the subject of the sexuality of the Ascomycetes through very hard and bitter times will smile with triumph at the recognition bestowed on *Sphærotheca*. Here it is, in an elementary book for the teaching of the innocent young botanist at the outset of his career.

Of all botanical writers, at all points of the compass, Dr. Scott is esteemed by his fellow-botanists as a man of caution, a foe to wild speculation. But apparently he has half-holidays or other brief periods of recreation in which he disports himself among untamed reflections. After commenting on the "close relationship of such a fungus as *Pythium* to such an alga as *Vaucheria*," he says (p. 291), "The most important difference is the disappearance of the spermatozoids, which are no longer differentiated in the fungus, the male protoplasm being carried to the ovum by the fertilizing tube. This change has been compared to the change from fertilization by a pollen-tube, in passing from cryptogams to phanerogams. In both cases the disappearance of motile male cells is correlated with the loss of aquatic environment," &c. Now all this may be so, and if the types of a well-regulated morphology alone existed, it would be acceptable and comforting. But what about *Saprolegnia*, for example? It also is a fungus with a similar likeness to *Vaucheria*. It also has a fertilizing tube, though it be an imperfect one. But it has not lost its aquatic environment. It is more aquatic, as a rule, than many species of *Vaucheria*. Are we then to suppose *Saprolegnia* to be a prophet?—or has it been doing its poor best to lose its fertilizing tube, with the result of impotency—or is it a mere unsuccessful toiler after *Pythium*, which it views from its watery home? or has it repented and gone back to the deep only to find it could never resume its full functional activity in this respect? Alas! these things may be amusing, but it is difficult to emancipate oneself from a moist environment of tears. Dr. Scott has permitted himself to state this one little apparently harmless bit of speculation unchecked by his habitual stern criticism. However, readers will not (as assuredly he will not) misunderstand our poking fun at so trivial a matter. The book has been greatly needed, and fulfils the expectations of those who have looked for it. The figures are excellent, and the "get-up" and price of the book satisfactory. It will, beyond doubt, have the long career of usefulness we cordially wish for it.

G. M.

Lehrbuch der ökologische Pflanzengeographie. Eine Einführung in die Kenntnis der Pflanzenvereine. Von Dr. EUGEN WARMING. Deutsche Ausgabe von Dr. EMIL KNOBLAUCH. Berlin: Borntrager. 1896. Pp. xii, 412. Price 7 Mark.

THE German translation of Warming's *Plantesamfund. Grundträk af den ökologiske Plantegeografi* will be welcomed in this country by not a few botanists who are unable to read the original. It is a valuable work, for it indicates the direction in which we must look for future development in botany. The laboratory worker and the naturalist converge. The key to our plant-lists and floras, and the general facts of geographical distribution, lies partly in the internal and external structure of the plants themselves, and the careful observation of the relations of anatomy and morphology to surrounding conditions will help us to find it. We should like to see an English translation, for it is a book which should be read by all botanists and naturalists. It would open up long vistas of useful work for men who are now wasting their time in the multiplication of brambles or in equally futile occupations.

Oecological plant-geography, as defined by the author, teaches us how plants and plant-societies adapt their form and their domestic economy to the factors acting upon them; for instance, to the amounts of warmth, light, food, water, &c., at their disposal. The most casual glance shows that in any given plant-area species are not equally divided, but are grouped in societies with widely differing physiognomies, each of which offers a three-fold problem. We must first determine what species occur together in similar stations, next the general appearance of the vegetation, and finally we have to attack the question, "Why are the species thus associated, and why has the vegetation its peculiar physiognomy?" As species are the units of the systematist, so for the oecological plant-geographer are the "Lebensformen," which nearly correspond with Humboldt's plant-forms and Grisebach's vegetation-forms. Rarely do we find the same "Lebensform" common to the species of a family, as in the *Nymphæaceæ*, where in harmony with the same conditions the same habit has been assumed. On the other hand, the same life-form may characterise families which are widely separated from a systematic point of view. A familiar example is the cactus type, which occurs also in the cactus-like euphorbias and stapelias. It is of importance to define a limited number of easily recognizable life-forms, and here again we meet a difficulty. What biological points are of the greatest importance and to form the basis for our oecological system? "It cannot be enough emphasized that the greatest advance, not only for biology in the broader sense, but also for oecological geography, will be the definition of the different life-forms: a goal from which we are still far distant."

The last task is the investigation of the plant-societies ("Plantesamfund") occurring in nature. These generally contain many species with widely differing forms. Such are meadows with their grasses and herbage, or a beech wood with the "red beech and all the species which usually accompany it." The members of such societies must bear the same relation to their environment, or must be closely interdependent—there must be a sort of symbiosis or syntrophy.

Having stated his case, the author treats his subject in seven sections. In the first (pp. 12–93) he discusses "the oecological factors and their operation." The composition of the air, light, temperature, mist, rain, wind, the physical and chemical properties of the soil, and the like, are taken in order. Section 2 (pp. 94–120) deals with symbiosis in general, and plant-societies in particular; while in the next four sections (pp. 120–350) the different societies are treated under four heads—Hydrophytes, Xerophytes, Halophytes, and Mesophytes. The first three groups are sufficiently defined by their names; Mesophytes are by contrast adapted to soil and air containing a moderate amount of moisture, and to soil which is not remarkable for the amount of salt, that is to say, this class comprises ordinary vegetation. The last section (pp. 350–382) is entitled "the struggle between the plant-societies," and the closing chapter is on the origin of species. The whole concludes with a bibliography and a copious index.

A. B. Rendle.

ARTICLES IN JOURNALS.[*]

Annals of Botany (Dec.). — D. H. Campbell, 'Development of *Geothallus*' (2 pl.). — A. J. Pieters, 'Influence of fruit-bearing on development of mechanical tissue.'—H. M. Richards, 'Respiration of wounded plants.' — F. A. F. C. Went, 'Notes on Sugar-cane diseases' (1 pl.). — W. C. Worsdell, 'Anatomy of stems of *Macrozamia* compared with other genera of *Cycadeæ*' (2 pl.).—'Report of discussion on ascent of water in trees.'

Bot. Centralblatt (Nos. 48–51). — H. Rothdanscher, 'Ueber die anatomischen Verhältnisse von Blatt und Axe der Phyllantheen' (concl.).—W. Futterer, 'Zur Anatomie und Entwicklungsgeschichte der *Zingiberaceæ*' (1 tab.). — (No. 50). W. Johannsen, 'Aether- und Chloroform-Narkose und deren Nachwirkung.'

Botanical Gazette (Nov. 23). — B. M. Davis, 'Development of procarp and cystocarp in *Ptilota*' (2 pl.).—E. A. Burt, 'Systematic account of the *Phalloideæ* of United States.' — N. M. Glatfelter, '*Salix cordata* × *sericea*.' — T. Holm, '*Amphicarpum*' (1 pl.).—L. M. Underwood, 'Ferns of Alabama' (1 pl.).

Bot. Notiser (häft 6). — P. Dusén, 'Den eldsländska ögruppens vegetation.' — L. M. Neuman, 'Studier öfver Skånes och Hallands Flora' (cont.).

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[*] The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Bot. Zeitung (Dec. 16). — A. Meyer, 'Die Plasmaverbindungen und die Membranen von *Volvox globator*, *aureus*, und *tertius* mit Rucksicht auf die thierischen Zellen' (1 pl.).

Bull. de l'Herb. Boissier (Nov.). — A. Jaczewski, 'Monographie des Erysiphées de la Suisse.'—R. Buser, 'Sur quelques Alchimilles du Caucase.'—J. Briquet, 'Fragmenta Monographiæ Labiatarum' (cont.).

Gardeners' Chronicle (Sept. 28). — J. Weathers, 'Monograph of *Erythronium*.' — (Oct. 3). *Acalypha Sanderi* N. E. Br., sp. n.—(Oct. 10). C. T. Druery, 'Percristate Ferns.'—(Oct. 17). *Gongora Sanderiana* Kranzl., sp. n. — J. G. Baker, '*Brodiæa* and allies' (cont.).—'Baron von Mueller' (portr.). — (Oct. 24). G. J. Burch, 'Röntgen illustrations of Flowers.' — (Nov. 7). *Passiflora galbana* Mast., sp. n. (fig. 97). — (Nov. 14). *Camoensia maxima* (figs. 105, 106).—(Nov. 28). W. B. Hemsley, '*Botanical Magazine* wrappers.' —Id., *Dipladenia Sanderi*, sp. n.—C. T. Druery, *Ceterach officinarum*. —(Dec. 5). J. G. Baker, '*Brodiæa* and allies' (concl.).—(Dec. 12). *Trichomanes roraimense* Jenm., sp. n. — D. Morris, 'Hassan Jackfruit' (fig. 125).

Journal de Botanique (Nov. 16, Dec. 1).—C. Sauvageau, 'Observations relatives à la sexualité des Phéosporées.'—A. Franchet, 'Compositæ novæ e Flora Sinensi.' — (Dec. 1). N. Patouillard, 'Note sur une cône de Pin déformé par une Urédinée.' — E. Malinvaud, 'Questions de Nomenclature.'

Oesterr. Bot. Zeitschrift (Dec.). — A. v. Degen, 'Über einige orientalische Pflanzenarten' (cont.). — L. J. Celakovsky, 'Ueber die ramosen Sparganien Böhmens' (concl.) — C. Baenitz, 'Ueber seltene und neue schlesische *Rubi* und *Rubi*-Hybriden.'—V. Schiffner, 'Bryologische Mittheilungen aus Mittelböhmen.' — J. Murr, 'Zur systematischen Stellung der *Galeopsis Murriana*.' — F. J. Slavicek, 'Morphologische Aphorismen über einige Coniferenzapfen.'

Trans. Linn. Soc. (Botany): 2nd ser. v. pt. 5 (Dec.). — W. West & G. S. West, 'Some North American Desmidiæ' (7 plates). — (pt. 6: Nov.). B. G. Cormack, 'Polystelic roots of certain Palms' (2 pl.).

BOOK-NOTES, NEWS, &c.

We learn from the MS. Report of Moss Exchange Club for 1896, which is circulated among the members, that over 2000 specimens of Mosses and Hepaticæ were contributed to the Club this season and exchanged. It has been found most helpful to beginners; and many rare species and varieties have also been sent in, among which the following interesting plants may be noticed:—*Campylopus Shawii* and *Didymodon cylindricus* var. *Holtii*, collected in Kerry, and sent by Rev. C. H. Binstead. *Leptodon Smithii* (Dicks.) Mohr., collected by Dr. Ferguson and Prof. T. Baker in Cumberland.

Amblystegium fallax Brid., from Stroud, E. J. Elliott; this is the var. *vallis-clausæ* of *Hypnum filicinum*. Mitten's var. *scabrellum* of *H. tenellum*, known by its rough seta, was sent from Lewes by W. E. Nicholson; and the new *Hypnum procerrimum* from Perthshire by R. H. Meldrum. Only a few Hepaticæ were sent, which included *P. cochleariforme* Weis., from Moidart by S. M. Macvicar; and *Lejeunea minutissima* and *Porella lævigata* from Gloucestershire by E. J. Elliott. Any person wishing to join the Club should communicate with the Hon. Sec., Rev. C. H. Waddell, Saintfield, Co. Down.

Another part (xxii.) of the *Flora of British India* appeared in December. Sir Joseph Hooker continues his elaboration of the *Gramineæ*. Dr. Stapf contributes certain genera—*Poa*, *Eragrostis*, *Festuca*, *Bromus*, *Catabrosa*; and the *Bambuseæ* are condensed from Mr. J. S. Gamble's monograph of the Bamboos of British India.

The Messrs. Linton have issued the second fascicle of their Set of British Hieracia. As in the first fascicle, the greater number of specimens are endemic, consisting of ten species and three varieties. Of the remainder, six are common to Britain and Scandinavia, and six are found throughout Europe. The following note accompanies the specimens:—"We include *H. pratense*, though doubtfully native, as it has been known for many years in its Scotch locality. *H. sinuans* is a recently-defined species of the *Nigrescentia*, not infrequent on the Breadalbanes. *H. rubicundum* is allied to *H. plumbeum* Fr., our plant being from the Moffat Hills, where it is fairly abundant. *H. murorum* vars. *pellucidum* and *lepistodes*, and *H. rigidum* var. *scabrescens*, have been recently identified as British by Dr. M. Elfstrand of Upsala. *H. holophyllum* seems confined to the limestone cliffs of Derbyshire. *H. subanfractum* is closely allied to *H. anfractiforme* Almq. *H. diaphanoides* var. *apiculatum* has been thought to resemble *H. diaphanum* Fr. var. *stenolepis* Lindeb., but their identity is denied both by Herr Dahlstedt and the author of the British variety. *H. umbellatum*, the form supplied is one with livid styles, but in other respects fairly typical."

Mr. I. H. Burkill has been appointed an assistant in the Kew Herbarium.

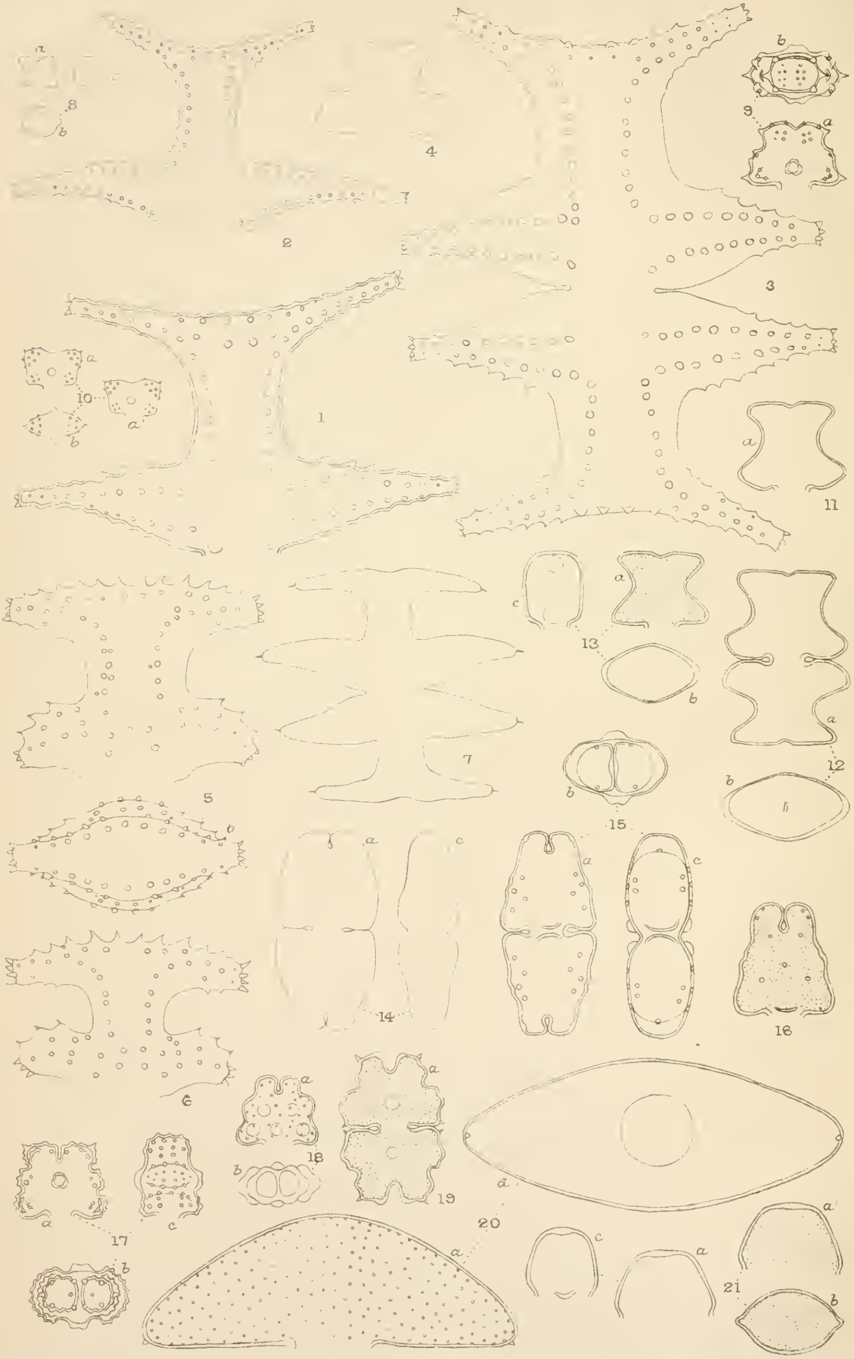
At the Linnean Society's meeting on Dec. 3rd, Mr. E. M. Holmes exhibited specimens of *Liebmannia major*, a seaweed not hitherto detected in Britain, and, so far as is known, recorded only from Finisterre. The specimens were collected at Lossiemouth, in August, 1896. He also showed *Bonnemaisonia hamifera*, collected in May last by Mr. E. George, and in August last by himself. In 1895 living specimens of this seaweed, a native of Japan, were found at Falmouth by the late Mr. T. H. Buffham, and during the present year other examples had been found at Shanklin, Isle of Wight, showing that the plant had apparently become naturalized.

In the *Annals of Botany* for December, Mr. G. C. Druce has a note on a British hybrid Gentian (*G. Amarella* × *germanica*) and on the well-known hybrids between *Linaria repens* and *L. vulgaris*. Notes on British plants are so infrequent in the *Annals* that it seems well to call attention to these, which might otherwise be overlooked.

David Robertson, LL.D., F.L.S., "The Naturalist of Cumbrae," died at Millport, Cumbrae, on the 20th November. He needed but a week to attain his ninetieth birthday, having been born in Glasgow on the 28th November, 1806. The Rev. T. R. R. Stebbing has told the story of his life in *The Naturalist of Cumbrae:* how he struggled with adversity, commenced a medical education, forsook it, went into business, and by the time he was fifty-four years old had made enough money to enable him to retire and devote himself to his beloved marine zoology. However, it is as a botanist that he is commemorated here. His knowledge of British Seaweeds was intimate, and in many cases critical, and he was the valued correspondent of students of this subject. He was a man of fascinating character, and of wonderful influence over the young people who during recent years went to work in the "Ark" at Millport. The progress of the new Zoological Station and Museum at Millport, which will be a permanent memorial of him, engaged his interests to the end.

The death is announced of Frederick Isaac Warner, F.L.S., of Winchester, on the 8th November last, at the age of fifty-five. Though for many years past incapacitated by ill-health for much out-of-doors botany, he retained the keen interest in the study which made him an ardent botanist in the years gone by. He was a contributor to this Journal, and, as his notes testify, a careful observer and student both of flowering plants and mosses, and the minuter fungi. Perhaps his most active work was done in connection with the Winchester and Hampshire Scientific and Literary Society, of the Botanical Section of which he was in 1871 secretary, and in 1872 became the general secretary, an office which he held till the end of 1876. In the Journal of the Proceedings of this Society he published, in 1871, a list of plants found within seven miles of Winchester, with the localities. He formed a very good and complete herbarium of Hampshire plants, and he furnishes lists of localities for Mr. Townsend's *Flora of Hampshire*, in which work his name is constantly given as the authority for localities. He became a Fellow of the Linnean Society in 1872.—F. S.

Alfred Chandler, who is included in the *Biographical Index of Botanists*, was born at Vauxhall on Jan. 31st, 1804, and died on Nov. 10th last. Although he cannot strictly claim rank as a botanist, his name is associated with the beautiful *Illustrations of Camelliæ* published in 1831, for which he prepared the drawings. We learn from the *Gardeners' Chronicle* for Nov. 21st, where a fuller notice of Chandler will be found, that he leaves behind him an extensive collection of drawings, which form an interesting record of horticultural progress. He died at East Dulwich.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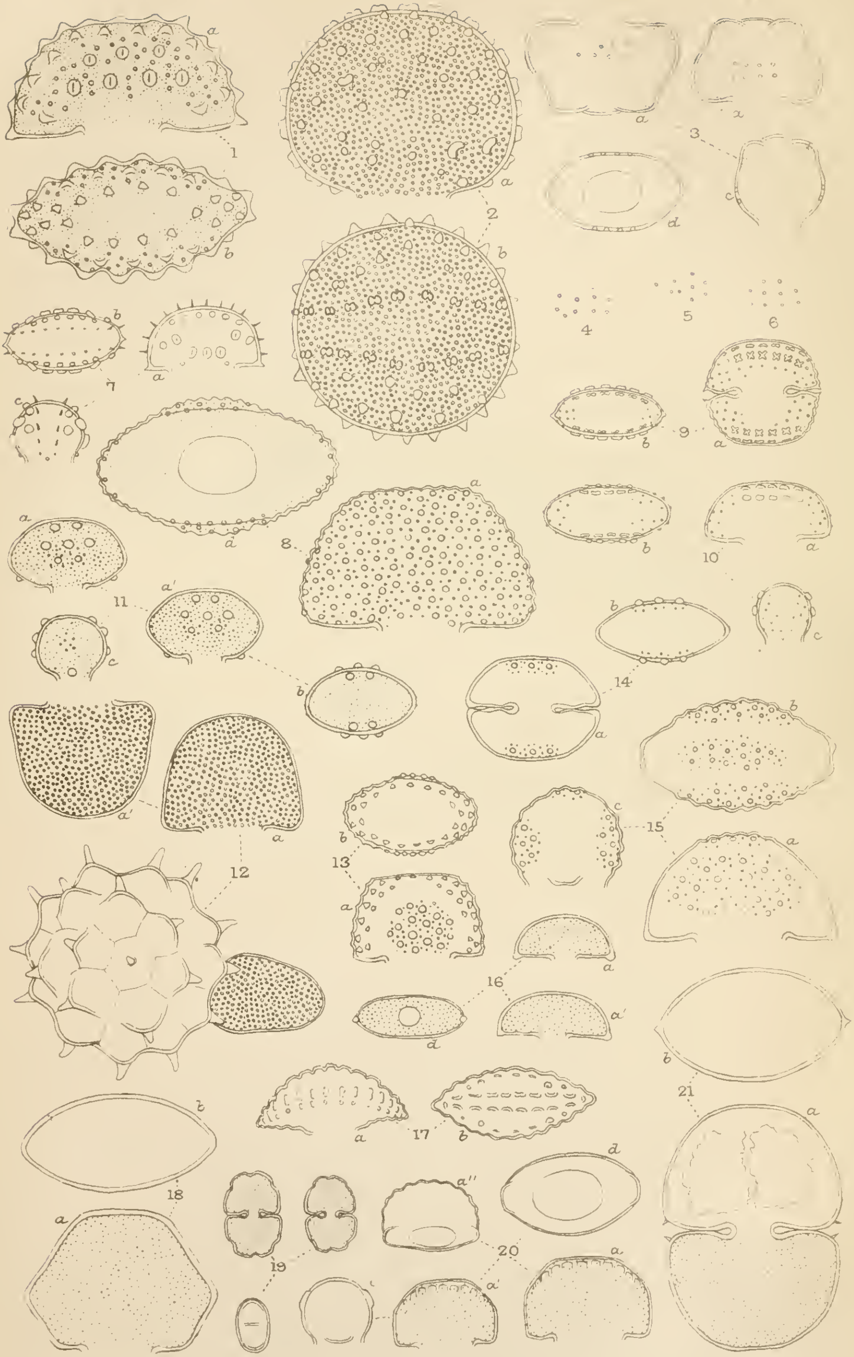
G.S.West ad nat del
R.Morgan lith

West, Newman imp

African Algæ.

Tab. 367.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G. S. West ad nat. del.
R. Morgan lith.

West Newman imp.

African Algæ

WELWITSCH'S AFRICAN FRESHWATER ALGÆ.

By W. West, F.L.S., and G. S. West, A.R.C.S.

(Plates 365–369.)

(Continued from p. 7.)

V.—Ulotrichaceæ.

1. Hormiscia Fries (1835); em. Aresch. (1866).

1. H. subtilis (Kütz.) De Toni, *Syll. Alg.* 159, 160 (1889). *Ulothrix subtilis* Kütz. *Phyc. German.* 197; Rabenh. *Flor. Europ. Algar.* iii. 365. Crass. fil. 5·5–6 μ.

Huilla. Frequens in pascuis pluv. autumnalibus frequentius inundatis, demum exsiccantibus ad lacum magnum de Ivantala, inter *Porphyrosiphonem Notarisii*; March 1860. No. 18.

Pungo Andongo. In pascuis spongiosis breve graminosis juxta rupes gig., May 1857. No. 111.

Var. variabilis (Kütz.) Kirchn. in Cohn, *Kryptog.-Flora von Schles.* 77 (1878). *Ulothrix variabilis* Kütz. *Species Algar.* 346; Rabenh. *l. c.* Crass. fil. 6·5 μ.

Pungo Andongo. Freq. temp. pluv. in summis rupib.; Febr. 1857. No. 6.

2. Stigeoclonium Kütz. (1843).

1. Stigeoclonium ? sp.

Huilla. Fragments amongst *Gonatonema tropicum*, &c., Morro de Lopollo; Febr. 1860. Nos. 172 and 186.

3. **Psephotaxus**, gen. n.

Thallus subfilamentosus, epiphyticus; fila brevissima, serie 3–7 cellularum formata, solitaria, subirregularia et flexuosa, simplices vel pseudoramosa, in muco firmo achroo nidulantes; cellulæ formarum et magnitudinum variorum, subglobosæ, ellipticæ, oblongæ vel subpyriformes, sæpe curvatæ; membrana cellularum crassissima et insigne lamellosa; contentum cellularum granulosum. Incrementum plantarum bipartitione cellularum intercalari.

1. **P. lamellosus**, sp. unica. Character idem ac generis. Diam. cell. 15–29 μ; long. cell. 15–45 μ; crass. membr. cell. 3–4 μ.

Pungo Andongo. Alga epiphytica in *Dichotriche gypsophila* (inter *Scytonema myochrous* var. *chlorographicum* et *Œdogonium tapeinosporum* var. *angolense*) ad latera boreal. et occid. de Pedra Songue; April, 1857. No. 12.

Huilla. In *Schizotriche natante* in graminosis paludosis juxta rivulum de Lopollo; April 1860. No. 180.

This is a most remarkable confervaceous alga, more especially on account of its short filaments of irregular cells with thick lamellose walls; the filaments are enclosed in an irregular mucus which seems to be formed from the outer lamellæ of the cells. One method of propagation is by the breaking up of the filaments into their component cells, each of which by division then forms a short irregular filament.

4. Conferva L. (1737); em. Lagerh. (1887).

1. C. bombycina Ag. *Syst. Algar.* 88; Wille in *Ofv. K. Vet.-Akad. Förhandl.* (1881), no. 8, 20-1.

Forma minor Wille, *l.c.* 21, t. i. fig. 36-40, t. ii. fig. 55, 56 (1881). Crass. fil. 6 μ.

Pungo Andongo. Ad ramulos Podostemacearum in rivulis (Casalalé); March 1857. No. 105.

2. C. sandwicensis Ag. *Syst. Algar.* 92 (1824); Nordst. *Alg. et Char. Sandwic.* 18, t. i. fig. 25. Crass. fil. 25 μ.

Mossamedes. Freq. in stagnis puris ad ripas flum. Bero, inter *Œdogonium* sp.; Aug. 1859. No. 190.

5. Microspora Thur. (1850); em. Lagerh. (1887).

1. M. amœna (Kütz.) Rabenh. *Fl. Europ. Algar.* iii. 321 (1868). *Conferva amœna* Kütz. *Species Algar.* 372 (1849). Crass. fil. 24-27 μ.

Golungo Alto. Ad rupes in flumine Luinha fluctuans; July 1856. No. 203.

2. M. Wittrockii (Wille) Lagerh. in *Bericht. Deutsch. Bot. Gesellsch.* v. 417 (1887). *Conferva Wittrockii* Wille in *Ofv. K. Vet.-Akad. Förhandl.* (1881), no. 8, 20, t. i. fig. 1-11 (1881). Crass. fil. 24 μ.

Golungo Alto. In stagnis parvis circa Fonte de Bança de Quilombo Quiacatubia, ast sparsim; Jan. 1855. No. 202.

3. M. abbreviata (Rabenh.) Lagerh. *l.c.* 417 (1888). *Conferva abbreviata* Rabenh. *Krypt. Flor. v. Sachs.* 246 (1863); *Flor. Europ. Algar.* iii. 323. Crass. fil. 8·5-10 μ.

Huilla. Alga lætissima viridis, lubrica, nebulosa, ad *Batrachospermum Huillense* in rivulis prope Lopollo; May 1860. Nos. 187 and 4.

4. M. Löfgrenii Nordst. in *Botaniska Notiser*, 1882, 55. *Conferva Löfgrenii* Nordst. in Wittr. & Nordst. *Alg. aq. dulc. exsic.* No. 421 (1882). Crass. fil. 15-20 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15. Etiam Morro de Lopollo; May 1860. No. 182.

Most of the plants had formed or were forming hypnospores, which when fully mature were globose or subglobose, with very thick lamellose walls; a few of these had evidently been formed from but part of the contents of a cell, and were externally nodulose. The cells had a very lamellose membrane, which character is most conspicuous during the formation of the hypnospores, the filaments becoming at this period more or less irregular, and the cell-septa also growing very greatly in thickness by the addition of lamellæ on each side. The filaments do not appear to break up in the manner of other species of *Microspora* and *Conferva*.

5. M. fontinalis (Berk.) De Toni, *Syll. Alg.* 230 (1889). *Conferva fontinalis* Berk. *Glean.* t. xiv. fig. 1. Crass. fil. 15-17 μ; a variety agreeing with var. *ochracea* Zanard. in the relative length of its cells, but occurring in dark green masses.

Loanda. In aquis puris stagnantibus subsalsis urbis Loandæ;

June 1858. No. 198. Also drawn up from the bottom of the drain at Welwitsch's house in Loanda, a stream which hardly receives the light of day through a narrow slit in the cover; April 1859. No. 145.

VI.—CHROOLEPIDACEÆ.

1. TRENTEPOHLIA Mart. (1817).

1. T. LAGENIFERA (Hildebr.) Wille, in Pringsh. *Jahrb.* xviii. 427 (1887). *Chroolepus lageniferum* Hildebr. in *Bot. Zeit.* 85, t. iii. (1861). Crass. fil. 12·5–15 μ; crass. zoogonidang. 23 μ, altit. 38 μ.

Golungo Alto. Inter *Scytonema insigne* ad rupes rivul. Coango humect.; June 1856. No. 140.

2. **T. phyllophila**, sp. n. T. epiphytica et phyllophila, in vivo et exsiccato viridis, filamenta rigidula patentim ramosa; cellulis diametro 1–1½-plo longioribus, leviter constrictis ad dissepimenta; ramis brevibus plerumque unilateralibus, filo primario æqualibus, erectis (angulos rectangulos formantes) interdum subdeflexis, cellulis diametro 1–2-plo longioribus; zoogonidangeis magnis obovatis vel pyriformibus, sessilibus, apicalibus vel lateralibus, granulis minutissimis viridibus farctis. Crass. cell. veget. 4·5–5·7 μ; long. zoogonidang. 20–26 μ, lat. 13·5–15·5 μ.

Golungo Alto. Ad folia plantæ aculis monocotyl. (quam nondum florentem vidi) in Mata de Quisuscula, prope Bango; July 1857. No. 148.

The green contents entirely fill the cells when living, but when dry they contract into a double-cone-shaped or dumb-bell-shaped mass in each cell. The branches rarely bear branchlets, except very short ones consisting of one or two cells. The species which most nearly approaches it is *T. tenuis* (Zell.) De Toni, from which it differs in its green colour, in its rather smaller size, in the equal thickness of its primary filaments and branches, and in its obovate zoogonidangia.

Forma subnana, fuscescens, cellulis paullo tumidis; crass. fil. 5–6 μ.

Golungo Alto. Ad muscorum surculos in rupibus juxta rivulos de Zengos do Queta; July 1856. No. 143.

VII.—CLADOPHORACEÆ.

1. RHIZOCLONIUM Kütz. (1843).

1. **R. crassipellitum**, sp. n. R. terrestre, cæspitosum, flavovirescens, flaccidula; filamentis crispulis, simplicibus (ramulis radicantibus nullis), cellulis diametro 1½–3-plo longioribus, hinc inde ventricoso-inflatis, curvatis et genuflexis; membrana crassissima et valde lamellosa; cellulis apicalibus subattenuatis et rotundatis; cellulis basalibus sæpe inflatis et interdum in rhizinis sublongis productis; zoogonidiis (ut observatis cl. Welw.) parvis, subsphæricis. Crass. fil. 33–43 μ; crass. membr. cell. 7–10·5 μ.

Loanda. In terra humida umbrosa locis cultis, Loanda; Aug. 1858. No. 205.

This species is characterized by its terrestrial habit, its very thick cell-walls, and the absence of rhizoids.

2. CLADOPHORA Kütz. (1843).

1. C. CRISPATA (Roth) Kütz. *Phyc. Gener.* 264 (1843); Cooke, *Brit. Freshw. Alg.* 143, t. 55, fig. 3. A form with the filaments not more than 1–1½ cm. high; branching subdichotomous, subsecund towards the apex; cells 6–12 times longer than broad.

Loanda. From the bottom of the well at Welwitsch's house in Loanda; Jan. 1859. No. 144.

2. **C. amplectens** Welw. MS.; name with partial description. C. cæspites duriusculos rigidos formans, læte virides, diametro circiter 12–15 cm., ericaceo-hispidulos, basin truncorum prope terram limoso-arenosam circa circum amplectentes; filis cartilagineo-elasticis, dense intertextis, subdichotome et sparsim ramosis, cellulis plerumque diametro 20-plo (vel usque) longioribus; ramis paullo angustioribus quam filamenta primaria, cellulis diametro 14–20-plo longioribus, granulis intense viridibus laxe repletis; cellulis terminalibus obtusis sæpe subclavatis; membrana delicate plicato-striata. Crass. fil. prim. 100–150 μ; crass. ram. 75–92 μ.

Loanda. Ad imam basis truncorum *Rhizophorarum* tempore refluxus oceani aëri expositarum ad littora Loandensia frequens; Nov. 1853. No. 23.

This species belongs to the section *Œgagropila*, and has rather a peculiar habit; Welwitsch likens the appearance of a tuft to that of a child's head.

3. CLADOPHORA sp. A minute fragment, insufficient for accurate determination; filaments about 1·5 mm. in length, branched repeatedly and irregularly; cells 1½–3 times as long as broad, mostly somewhat inflated, terminal cells acutely conical. Crass. cell. 33–56 μ. On Helices in Lagoa de Quibonda; Sept. 1857. No. 200.

VIII.—PITHOPHORACEÆ.

1. PITHOPHORA Wittr. (1877).

1. **P. radians**, sp. n. P. gracilis et radiata, elegantissima (13–18 cm.); foliis primariis plantarum fertilium thalli cauloidei crassitudine circiter 114 μ (104–130 μ); ramos ordinis primarii etiam paucos ordinis secundi (crass. circ. 64 μ) gerens; cellulis vegetativis diametro 6–16-plo longioribus; sporis solitariis, intercalaribus terminalibusque; sporis intercalaribus subcylindricis et leviter inflatis, long. 150–200 μ, lat. 100–120 μ; sporis terminalibus ovato-ellipticis base truncato, apice conico et obtuse subacuminato, long. 200–266 μ, lat. 91–116 μ; sporis subfrequentibus his locis ubi rami oritur.

Loanda. Copiose in aquariis aquæ subdulcis insulæ Cassanga prope Morro da Cruz; April 1854. No. 197. "Stirps vegetationis suæ luxuria et vitæ fugacitate æque insignis."

The nearest species to this is *P. Œdogonia* (Mont.) Wittr., from which it differs in its much greater thickness, in having no branches of a third order, in never having binate spores, and in the intercalary spores being much less inflated.

IX.—TEMNOGAMETACEÆ.

Ordo novus *Conjugatarum*, conjugatio solum inter cellulis speciatim abstrictas.

1. Temnogametum, gen. n.

Cellulæ vegetativæ ut in *Mougeotia*, cylindricæ, chromatophoro elongato complanato pyrenoidibus uniseriatim dispositis; propagatio zygosporis conjugatione scalariformi lateralive cellularum brevium specialium abstrictarum formatis.

1. **T. heterosporum**, sp. unica. T. cellulis vegetativis diametro 6–12-plo longioribus, chromatophoris pyrenoidibus parvis globosis 1–6 (plerumque 5); cellulis conjugantibus diametro 1½–2½-plo longioribus; zygosporis ubi conjugatione scalariformi productis pæne ×-formibus, robustis cum angulis truncatis, ubi conjugatione laterali oblique subcylindricis, latere altero recto concavove, altero convexo, polis truncatis. Crass. cell. veget. 14·5–17 μ; lat. zygosp. conj. scal. form. 48–59 μ, long. 39–50 μ; lat. zygosp. conj. later. form. 20–26 μ, long. 61–67 μ.

Huilla. Forming dense intricate masses with *Gonatonema tropicum*, *Zygnema spontaneum*, and *Stigeoclonium?* sp., Morro de Lopollo; Febr. 1860. No. 172.

This is a remarkable plant more particularly on account of its special conjugating cells; these are short, and cut off either singly or in pairs at intervals along the filaments. In the former case the conjugation is scalariform; these special cells in two contiguous filaments put out short rounded conjugating tubes which unite, the cells themselves becoming bent towards each other, and very soon *the two cells coalesce and form the zygospore*. In this way a zygospore is produced which at first sight very much resembles the central cell of the five cells constituting the spore of a *Mougeotia* of the section *Staurospermeæ*. In those filaments in which the pairs of cells are cut off the conjugation is lateral, the two cells forming a zygospore much resembling the aplanospore of a *Gonatonema*. In fact, these zygospores are oblique, and the convexities and concavities alternate along the filament precisely as in the case of a sporiferous filament of the latter genus.

Both scalariform and lateral conjugation occur in the same filaments. In all the specimens observed (which had been dry for a long period) the contents of the thick-walled spores appeared to have contracted into two approximate rounded masses; whether the latter had ever been perfectly united or had yet to unite within the wall of the spore is a matter that could not be definitely decided from the material.

On account of the peculiar conjugation, this plant must be placed as the type of a new order—*Temnogametaceæ*—of *Conjugatæ*.

X.—ZYGNEMACEÆ.

1. MOUGEOTIA Ag. (1824); em. Wittr. (1878).

1. **M.** (§ STAUROSPERMUM) **uberosperma**, sp. n. M. cellulis vegetativis diametro 4–8-plo longioribus, cellulis conjugatis genuflexis; zygosporis maturis angulari-globosis (cum angulis 5–6),

membrana crassissima et lamellosa, achroa, cum processibus solidis mamillatis achrois 4, plerumque inæqualibus, unoquoque in unum cellulæ conjugatæ projecto. Crass. cell. veget. 6–8 μ; diam. zygosp. sine proc 21–27 μ; crass. membr. 3–6 μ; long. proc. 3–18 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This characteristic species belongs to the section *Staurospermum;* in maturely conjugated specimens this can only be inferred from the genuflexed conjugating cells, but the young zygospores are subrectangular or subquadrate. The four processes present on the zygospores are developed very early, considerably before the zygospores are ripe, and are rarely of equal length; they are of the same diameter as the vegetative cells, and fit into them very closely.

2. **M.** (§ STAUROSPERMUM) **irregularis**, sp. n. M. cellulis vegetativis diametro 5–6-plo longioribus, cellulis conjugatis subcurvatis; zygosporis maturis irregularibus, subrectangularibus vel trapeziformibus, exospora crassa achroaque, ad angulos in processus longitudinum varium (nonnunquam cum 1–3 processum usque 29 μ) productis, mesospora crassa, flava vel flava-brunnea, punctata. Crass. cell. veget. 13·5–15 μ; long. max. zygosp. c. proc. irreg. 38–63 μ, lat. max. 42–48 μ.

Pungo Andongo. In pascuis spongiosis breve graminosis juxta rupes gigant. prope Catete; May, 1857. No. 111.

The nearest species to this is *M. capucina* (Bory) Ag., from which it is distinguished by its size, its colour, and its curious zygospores.

3. **M.** (§ CRATEROSPERMUM) **angolensis**, sp. n. M. cæspitibus læte viridibus dense intricatis; cellulis vegetativis diametro 4–5-plo longioribus, pyrenoidibus minimis 4–6 (plerumque 5), serie plus minusve irregulari intra chromatophorum; zygosporis parvis breviter cylindricis (a fronte visis quadratis), lateribus concavis, angulis acutis; cellulis conjugatis genuflexis. Crass. cell. veget. 25–29 μ; diam. zygosp. 19–21 μ.

Pungo Andongo. Ad ramulos Podostemacearum in rivulis (Casalalé), inter *Œdogonium Rothii* f. *major;* March 1857. No. 105.

This species differs from *M. lætevirens* (A. Br.) Wittr. chiefly in the chromatophores each possessing a much fewer number of pyrenoids, and in the much smaller zygospores.

4. MOUGEOTIA sp. Crass. cell. veget. 19–21 μ; diametro 4–6-plo longioribus.

Huilla. Ad culmos Eleocharidis fluitantis in rivulis de Morro de Lopollo (5300 ped. altit.); Febr. 1860. No. 188.

Mossamedes. Freq. in stagnis puris ad ripas flum. Bero; Aug. 1859. No. 190.

5. MOUGEOTIA sp. Crass. cell. veget. 20–25 μ.

Huilla. Inter *Utriculariam ecalcaratam*, Morro de Lopollo; April 1860. No. 179.

Conjugation incomplete; conjugating cells much bent.

2. GONATONEMA Wittr. (1878).

1. **G. tropicum**, sp. n. G. cellulis vegetativis diametro circiter 7- (6–8)-plo longioribus; aplanosporis permagnis, a fronte visis

oblique sphericis, cum processu mamillato solido projectente intra extremitates curvatas cellulæ ad polum unumquemque, a latere visis globosis cum processibus exacte oppositis ad polos; sporis membranis tribus, membrana mediana luteo-fusca et scrobiculata, membrana exteriori achroa et ad polum unumquemque unus processuum fit. Crass. cell. veget. 6–7 μ; long. aplanosp. sine proc. 27–29 μ, cum proc. 42–46 μ; lat. aplanosp. 27–28 μ.

Huilla. Alga læte viridis, lubrica ad rupes submersas de Morro de Lopollo; Febr. 1860. No. 186. Inter *Temnogametum heterosporum*, Morro de Lopollo; Febr. 1860. No. 172. In paludibus exsiccandis; April 1860. No. 176. Inter *Microsporam Löfgrenii*, Morro de Lopollo; May 1860. No. 182.

This is a most characteristic species; spores with processes of this nature are possessed only by two other algæ in the order *Zygnemaceæ*, viz. *Mougeotia uberosperma* and *M. irregularis*. The consecutive spores, which are very large, are alternately oblique, the cells containing them being very slightly bent alternately to the right and left.

3. **Pyxispora**, gen. n.

Cellulæ vegetativæ ut in *Zygnema*, conjugatione scalariformi; zygosporæ tubam conjugantem totam inter filamenta complentes; zygosporæ e parte solum contenti cellularum formatæ, elliptico-oblongæ vel ellipsoidæ cum porca cingente in planitie diametrorum brevissimorum et rima circumscissa secundum porcam.

1. **P. mirabilis**, sp. unica. P. cellulis vegetativis diametro $1\frac{1}{2}$–$4\frac{1}{2}$-plo longioribus, chromatophoris subdistinctis, pyrenoide parvo subgloboso ellipticove in chromatophoro unoquoque; tuba conjugante supra porcam zygosporæ indistincte visa. Crass. cell. veget. 12–13·5 μ; long. zygosp. 19–23 μ, lat. 13·5–17 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

The fact that only a portion of the contents of the conjugating cells participates in the formation of the zygospore indicates a relationship to the fam. *Mesocarpeæ*, although the arrangement of the chromatophores in the ordinary vegetative cells much resembles the arrangement in the genus *Zygnema* (fam. *Zygnemeæ*). The character of the zygospores is, however, quite unique, and the plant must therefore be placed in a new family, *Pyxisporeæ*.

4. ZYGNEMA Ag. (1824).

1. Z. ERICETORUM (Kütz.) Hansg. in *Archiv. Naturw. Landesdurchf. von Böhmen*, Bd. vi. 155–6 (1888). *Zygogonium ericetorum* Kütz. *Phyc. Gener.* 280 (1843). Crass. cell. veget. 27–32 μ; diametro $1\frac{1}{4}$–3 plo longioribus.

Pungo Andongo. Inter *Œdogonium* sp. ad limum juxta rivulum de Casalalé; Febr. 1857. No. 106. Inter *Œdogonium Rothii* f. *major* ad ramulos Podostemacearum in rivulis (Casalalé); March 1857. No. 105. Ad Podostemaceas in riv. de Cabondo; Febr. 1857. No. 108.

Huilla. In udis sylvaticis et apricis inter Monino et lac. Ivantala; April 1860. No. 14. In paludibus exsiccandis; April 1860. No. 176; crass. cell. veget. 27–34 μ; diametro 1–3-plo longioribus.

2. Z. SPONTANEUM Nordst. *Alg. et Char. Sandvic.* 17, t. i. f. 23–24 (1878). Z. cellulis vegetativis diametro 1½–4-plo longioribus; conjugatione scalariformi, cellulis fructiferis non (vel levissime) inflatis: zygosporis plerumque oblongis vel rotundo-ellipticis (raro globosis), membrana crassa et aureo-brunnea, lamina mediana cum scrobiculis magnis; aplanosporis (cfr. cl. Nordst. l. c.) zygosporis similibus sed minoribus, globosis, et membrana tenuiori. Crass. cell. veget. 16–18 μ; crass. cell. fructif. 19–25 μ; long. zygosp. 24–31 μ, lat. 21–24 μ.

Huilla. Inter *Gonatonema tropicum*, *Temnogametum heterosporum*, &c., Morro de Lopollo; Febr. 1860. No. 172.

This most interesting species has very remarkable spores both with regard to their colour and markings. The original specimens from the Sandwich Islands described by Dr. Nordstedt had only aplanospores (hence the specific name); the African specimens have only zygospores, and on account of their presence it has been required to amend the description. The relationship between the aplanospores and zygospores in this species is in all respects comparable to that between those of *Z. pachydermum* West; in the latter species the aplanospores are also smaller, globose, and possess a thinner membrane.

3. ZYGNEMA sp. Crass. cell. veget. 15–21 μ; diametro 3–6-plo longioribus.

Pungo Andongo. Cum Scytonemate in Pedra Songue; April 1857. No. 153.

5. SPIROGYRA Link (1820).

1. SPIROGYRA sp. Cellulæ vegetativæ diametro (23 μ) circiter 3-plo longioribus, extremitatibus non replicatis, chromatophoro uno, anfractibus 1½; zyyosporis ellipticis, polis subacutis, membrana glabra, luteo-fusca; cellulis fructiferis subinflatis; long. zygosp. 38–52 μ, lat. 23–30 μ. Prope *S. arcta* (Ag.) Kütz. var. *catæniformis* (Hass.) Kirchn.

Huilla. Inter alias algas in uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15. Not in sufficient quantity for absolute specific determination.

2. SPIROGYRA sp. Cellulæ vegetativæ diametro (36·5–46 μ) 2–3-plo longioribus, extremitatibus non replicatis, chromatophoris 2, anfractibus 3–4.

Pungo Andongo. Inter *Batrachospermum nigrescens* in flum. Cuanza; March 1857. No. 104. Ad rupes humidas juxta flum. Cuanza; March 1857. No. 156.

Golungo Alto. Cellulæ vegetativæ diametro (43–48 μ) 2–3½-plo longioribus, extremitatibus non replicatis, chromatophoris 2, anfractibus circiter 4. Freq. in semistagnantibus ad ripas Rivi Quiapoze, Caminho pr. Mussengue; Sept. 1855. No. 207.

3. SPIROGYRA sp. Crass. cell. veget. 44–53 μ.

Pungo Andongo. Ad ramulos Podostemacearum in rivulis; March, 1857. No. 109. Nothing can be made out of the specimens with any precision. Chromatophores 3 (?), edges smooth (?), spirals lax.

4. S. NEGLECTA (Hass.) Kütz. *Species Algar.* 441 (1849); Rabenh. *Fl. Europ. Algar.* iii. 248; Petit, *Spirog. de Paris*, 26, t. ix. f. 1–5. *Zygnema neglecta* Hass. *Brit. Freshw. Alg.* 142, t. 23, f. 1–2 (1845).

Var. TERNATA (Ripart). *S. ternata* Ripart in *Bull. Soc. Bot. Fr.* xxiii. 162 (1876); Petit, *l.c.* 26, t. viii. f. 4–7. *S. ternata* Ripart seems to us to be but a variety of *S. neglecta*, differing only in its inflated fructiferous cells. The length of the cells agrees in both. Cfr. also W. & G. S. West in *Journ. Bot.* xxxiv. 378 (1896); crass. cell. veget. 52–57 μ; long. zygosp. 107–127 μ, lat. 63–67 μ.

Huilla. Frequentissima post pluv. autumnal. ad margines rivulorum prope Lopollo; April, 1860. No. 185.

5. SPIROGYRA sp. Cellulæ vegetativæ diametro (52–61 μ) $1\frac{1}{4}$–2-plo longioribus, extremitatibus non replicatis, chromatophoris 3, anfractibus $1\frac{1}{2}$–2.

Pungo Andongo. Inter *Batrachospermum nigrescens* in riv. Cuanza; March 1857. No. 104.

6. **S. angolensis** Welw. MS. (name with partial description). S. nubeculiformiter crescens, mox subnatans, sordide viridis, adulta fuscescens; cellulis vegetativis diametro 1–2-plo longioribus, extremitatibus non replicatis; chromatophoris 2 (raro 3), latis cum marginibus asperis et pyrenoidibus magnis, anfractibus 2–3; filamentis fructiferis atro- vel fusco-purpureis, rigidis, cellulis fructiferis non inflatis (vel leviter subinflatis); zygosporis magnis, pæne cellulas complentibus, ellipticis cum apicibus subacutis, diametro $1\frac{1}{2}$–$1\frac{3}{4}$-plo longioribus. Crass. cell. veg. 49–63 μ; long. zygosp. 84–100 μ, lat. 52–57 μ.

Loanda. Cum Octogonis æquinoctiali in aquis stagna puris (Cazimba) urbis Loanda; June 1858. No. 124. In stagnis artificialibus (Repressas) circa Loandam; July 1854. No. 193. Etiam No. 103.

The very dark-coloured conjugating filaments and the form of the zygospores characterize this species. *S. arcta* (Ag.) Kütz., to which No. 193 was referred by Welwitsch, is a much smaller plant with but one chromatophore, and the conjugating filaments are not dark-coloured.

7. **S. Welwitschii**, sp. n. S. cellulis vegetativis diametro $\frac{1}{2}$-2-plo longioribus, extremitatibus non replicatis; chromatophoris 2 (raro 3), magnis, cum marginibus serratis et pyrenoidibus magnis, anfractis arctis, 1–2; cellulis fructiferis non inflatis; zygosporis late ellipticis, diametro $1\frac{1}{6}$-plo longioribus, cellulas fructiferas non complentibus. Crass. cell. veget. 65–75 μ; long. zygosp. 69–71 μ, lat. 57–58 μ.

Loanda. "Sp. dense agmine crescens, nubecularum amœniss. virid. ad instar aquis innatans; in stagnis artificialibus circa Loandam" (c. *S. angolensi* Welw.); July 1854. No. 103.

This species approaches *S. decimina* (Müll.) Kütz. (to which Welwitsch had referred it) and *S. neglecta* (Hass.) Kütz.; it differs from the former in its much greater thickness, shorter cells, and larger zygospores; from the latter in its somewhat thicker filaments, shorter cells, the character of its chromatophores, and in its shorter zygospores.

The following may belong to this species:—

Pungo Andongo. Cellulæ vegetativæ diametro (63–82 μ) $1\frac{1}{4}$–$2\frac{1}{2}$-plo longioribus, extremitatibus non replicatis; chromatophoris 3 (?), magnis cum marginibus serratis et pyrenoidibus magnis. In stagnis ad latera rivulorum; Febr. 1857. No. 206.

8. Spirogyra sp. Cellulæ vegetativæ diametro (67–78 μ) 3–$4\frac{1}{2}$ (usque 7)-plo longioribus, extremitatibus non replicatis; chromatophoris 3, cum marginibus subglabris et pyrenoidibus parvis sparsisque, anfractibus 2–3 (vel pluribus).

Loanda. "In Angolæ stagnis agri Loandensis"; Febr. 1854. No. 125.

9. **S. cylindrospora**, sp. n. S. cellulis vegetativis diametro $1\frac{1}{2}$–4-plo longioribus, extremitatibus non replicatis; chromatophoris 4, angustis, laxissimis, cum marginibus subglabris, anfractibus 1–3; conjugatione scalariformi et laterali, cellulis fructiferis non inflatis; zygosporis breviter cylindricis, polis rotundatis, lateribus cellularum fructiferarum zygosporas arctissime tangentibus, tam longis quam latis (sæpius longioribus); membrana zygosporæ maturæ crassa, lutea, lamina mediana crassissima, scrobiculata-punctata. Crass. cell. veget. 70–77 μ; long. zygosp. 78–98 μ, lat. 70–77 μ; crass. membr. 6–6·5 μ.

Pungo Andongo. In stagnis prope Anbilia (Condo); March 1857. No. 177.

The shortly cylindrical zygospores are very characteristic, fitting the cells like plugs pushed into them.

10. Spirogyra sp. Cellulæ vegetativæ, diametro (115–126 μ) 1–$1\frac{1}{2}$-plo longioribus, extremitatibus non replicatis; chromatophoris multis, anfractibus arctis.

Golungo Alto. Freq. in semistagnantibus ad ripas rivi Quiapoze, Caminho pr. Mussengue; Sept. 1855. No. 207.

(To be continued.)

ON SOME SCOTTISH RUBI.

By the Rev. W. Moyle Rogers, F.L.S.

A first visit to Scotland last summer gave me a long-desired opportunity of studying some of the living Rubi north of the Tweed. Numerous bundles of specimens received in the course of the last few years had shown me that the forms most commonly met with in Scotland are practically identical with those that prevail in the South of England; but I was hardly prepared to find how general the similarity really is.

Day after day, for a month, *nearly* all the brambles that I saw, as I moved about in five counties, were literally indistinguishable from those one commonly meets with in the south. A few were unfamiliar; glandular forms were exceptionally scarce; and it was a surprise to me to see no *R. rusticanus** or *R. leucostachys** anywhere; but ordinarily each bramble was familiar enough, and might have been growing in England.

The only neighbourhood that I was able to explore at all thoroughly was that of Callander, in West Perth, where I stayed three weeks. I found the Callander Crags exceedingly good bramble ground, and the shores of Loch Earn, Loch Vennachar, and Lake of Monteith, all in W. Perth. In Mid-Perth, the Knock of Crieff and the neighbourhood of Killin and Loch Tay proved to be happy hunting grounds for me, though my visits to them were provokingly hurried. At Oban (Argyle) I had only two hours, and scarcely more at Balloch (Dumbarton). To Cramond Bridge (Linlithgow) I went twice, for two or three hours at a time; but there brambles were few and far between. In Stirlingshire I had especially unfavourable weather, but under the guidance of Mr. Robert Kidston and Colonel Stirling was able to examine Stirling Castle Hill and the Gargunnock neighbourhood.

During my stay at Callander I was helped by my son, F. A. Rogers, who brought me fresh specimens from a few localities beyond my reach. In the following notes W.P. stands for West Perth, M.P. for Mid Perth, A. for the county of Argyle, D. for Dumbarton, L. for Linlithgow, and S. for Stirling. From all the places named I saw last July newly gathered pieces, and, with very few exceptions, the living plant *in situ*. As on so many previous occasions, I am again indebted to Dr. Focke for helping me to name forms not before certainly detected in Britain, and for reducing my other difficulties.

Rubus Idæus L. The ordinary form was remarkably abundant, and very generally distributed; and on Callander Crags I also saw several patches of var. *asperrimus* Lees (with "white" fruit).

Suberecti.

R. fissus Lindl. W.P. Locally abundant in open heathy places about Callander, L. Vennachar, Strathyre, and L. Earn. M.P. Knock of Crieff.

R. suberectus Anders. W.P. In two spots near Callander; in one place between Strathyre and L. Lubnaig. M.P. By L. Tay, one bush. Nowhere seen in any quantity.

R. plicatus W. & N. W.P. Fairly widespread, but not usually in great quantity, except between Callander and Lake of Monteith; the Crags; near Lochs Vennachar, Lubnaig, and Earn; near Aberfoyle. M.P. Knock of Crieff. D. Balloch.

R. Rogersii Linton. I think the most abundant and most conspicuous suberect bramble in W.P., though on the Crags and in two or three other places *R. fissus* may be locally as plentiful. From L. Earn to Callander, and from Callander to Aberfoyle, occurring frequently and without variation, so as to constitute one of the marked features of the *Rubus*-flora of the vice-county. After careful study of the living bushes, I am inclined to think this species almost or quite as near to *R. fissus* as to *R. plicatus;* and although I occasionally came on all three as near neighbours, I saw no intermediate forms. It is evidently a very early flowerer, and all the later panicles are more leafy and prolonged than the first. Its leaves are greyish green, and the whole plant of a paler tint than its allies. M.P. Knock of Crieff.

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* Ayr, Kincardine, Clyde Isles, and Hebrides are, I believe, the only Scottish counties from which *R. rusticanus* has yet been recorded; and I know of two only (Berwick and E. Sutherland) for *R. leucostachys*.

R. latifolius Bab. L. Near Bridge of Cramond; in very small quantity, and not quite so strongly marked a plant as the *R. latifolius* of Anglesea, though not, I think, specifically distinct from it.

As compared with the brambles of most other groups, suberect plants seem to be exceptionally abundant in Perthshire; but even there, and still more in other parts of Scotland, the number of species as yet found in this group is comparatively small.

RHAMNIFOLII.

I should suppose that quite half of the bramble plants that I saw growing in Scotland last July belonged to this group. More than half of the Rhamnifolians known for Britain occurred in the localities I visited, and many of them in great quantity.

R. incurvatus Bab. W.P. By L. Earn; well-marked examples of this species, though with narrower panicle than is usual in the typical Welsh plant.

R. Lindleianus Lees. W.P. By L. Earn, in great quantity; near Aberfoyle; Callander Crags. M.P. By L. Tay, abundant. D. Balloch. Just the typical plant everywhere.

R. rhamnifolius W. & N. (sp. collect.). W.P. Only on the Crags, and there in no great quantity. A rather small form, not very conspicuously different from the common British plant (*R. cardiophyllus* Lefv. & Muell.), but I thought showing rather closer affinity with *R. pulcherrimus* Neum. than is usual in England. S. Near Stirling, by the King's Park and the Cemetery (*R. cardiophyllus*).

R. nemoralis P. J. Muell. W.P. Black Cock Hill, near Callander. I did not see this growing, but my son brought me fresh specimens. I think the ordinary Dorset form.

R. pulcherrimus Neum. W.P. By L. Vennachar; Strathyre; Callander; not very abundant, but quite characteristic. A. Oban; very luxuriant and handsome plants, close to the town and in rocky places above. D. Balloch, by L. Lomond.

R. SCHEUTZII Lindeb. (= *R. Lindebergii* P. J. Muell., var. *viridis* Aresch.). Dr. Focke has thus named one of the most abundant and most constant brambles seen by me in Mid-Scotland, and he adds, "As far as I can see from dried specimens, exactly the same as the Swedish plant." I had been able to send him characteristic pieces in excellent condition, with careful notes from the living plant, and had called his attention to its affinity with his *R. Maassii;* and this drew from him the further remark, "*R. Maassii* is very near it." W.P. Exceedingly common about Callander, L. Vennachar, Lake of Monteith, and between it and Aberfoyle. M.P. Knock of Crieff. S. About Stirling and Gargunnock; in great quantity. D. Balloch. I also have dried specimens collected by the Rev. E. S. Marshall last summer at Crianlarich (M.P.). I do not remember having ever seen living bushes of this species out of Scotland; but some 1893 and 1895 specimens from Mr. J. E. Griffith, collected at Valley, near Holyhead (Anglesea), seem identical with the Scottish plant. I should say that its nearest allies in our list are *R. pulcherrimus* Neum. and *R. Lindebergii* P. J. Muell.; but its peculiar leaves, glabrous stem, and very different colouring make it recognizable from both at a glance; nor do I think it possible for any careful observer to confuse the living bush with other British forms. The following are its most marked characters:—It grows in large, rather low, circular masses, with glabrous shining stem, green rhamnifolian nearly glabrous leaves, a remarkably broad subrotund-cuspidate terminal leaflet, and a long very narrow more or less flexuose panicle with large flowers, long stamens, pinkish-lilac petals, and grey-green sepals, which are only loosely reflexed on the fall of the petals, and become more or less subpatent afterwards.

R. Lindebergii P. J. Muell. W.P. In the higher part of the Callander Crags; just the continental and ordinary English form. Also brought to me fresh by my son from the neighbourhood of Aberfoyle.

R. dumnoniensis Bab. A. Oban; extraordinarily abundant in rocky places above the town, in very handsome wide-spreading masses, usually to the exclusion of all other brambles. This is proving to be one of our most widely distributed and most constant species.

R. villicaulis Koehl. The form which I described in *Journ. Bot.* 1894, 43, 44, as "var. c. *insularis* (F. Aresch.)" is one of the most abundant and most characteristic of Scottish brambles. As I showed when describing it, it is very distinct from vars. *Selmeri* and *calvatus;* but I had to own then that I was "at a loss to name any very definite characters by which to separate this var. from the typical plant." Now, on my sending to Dr. Focke a good series of the Scottish form labelled "*R. villicaulis* Koehl. var. *insularis* (F. Aresch.), or form near it," he writes to me, "The form called *R. insularis* Aresch. is the true typical *R. villicaulis*, first described from Silesia, E. Germany. The common form of N. Germany is much more like your English *R. calvatus*." I am not sure that we have quite this "common form of N. Germany" in Britain; but we have something very near it, if not identical with it, in S. Devon, and probably sparingly elsewhere. Omitting that for the present, our list of forms is reduced to typical *R. villicaulis* (= *R. insularis* F. Aresch.), and the two very strongly marked varieties or subspecies, *R. Selmeri* Lindeb. and *R. calvatus* Blox. *R. calvatus* has not yet been observed in Scotland, but *R. Selmeri* is extraordinarily abundant, and the typical plant hardly less so. Thus in W.P. this type is especially strong and handsome on the Crags and elsewhere about Callander, extending to L. Earn northwards and to Aberfoyle westwards. I also saw it about Killin in M.P., at Oban in A., and near Cramond Bridge in L.; and I have received dried specimens of it in most of my Scottish *Rubus* parcels. Other distinctive characters which may be added to my description of this form in *Journ. Bot.* 1894, 44, are—Stem hairy, with crowded long short-based straight prickles, and petals white or very faintly pinkish, narrow, long-clawed. *R. Selmeri* seems to be the commonest fruticose bramble in Scotland, as in most parts of the British Isles. Wherever, in the five counties I visited last July, I saw brambles in considerable quantity, I invariably came on this; and usually as one of the most conspicuous, as always one of the most easily recognized forms. For this var. therefore I abstain from giving localities in detail.

R. rhombifolius Weihe. I think certainly a strong form of this in one place between L. Vennachar and Callander (W.P.).

Silvatici.

R. macrophyllus W. & N. (sp. collect.). Not seen in good quantity, nor in typical form. W.P. On a plant occurring between Callander and Lake of Monteith, which I thus named somewhat hesitatingly, Dr. Focke writes, "*R. macrophyllus:* a small and very hairy variety, corresponding to a similar variety of *R. pyramidalis.*" M.P. Between Killin and L. Tay, for some distance along a steep and partially shaded bank, occurs a large handsome form with glandular panicle and ascending sepals. Here also Dr. Focke agreed with me in giving this name in an aggregate sense, adding the note, "leaves tapering towards the base as in *R. Schlechtendalii*, sepals patent after flowering. Somewhat off type." S. Gargunnock, wood-border. A weak shade form.

R. hirtifolius Muell. & Wirtg., var. DANICUS Focke. Dr. Focke accepts this name that I gave to a frequent and very handsome Scottish bramble, for which I as yet know no certain English locality, though I have so named Westmeath specimens collected by the Rev. E. F. Linton in 1895. The following is Dr. Focke's note on my W. Perth specimens:—"This is indeed my *Rubus danicus*, which I put as a variety under *R. hirtifolius* Muell. & Wirtg. It is a plant that is nearly intermediate between *R. macrophyllus* and *R. pyramidalis.* Terminal leaflet much more rounded than in either species." It seems to me much nearer to var. *Schlechtendalii* than to typical *macrophyllus*, though distinguished from both without difficulty by the ascending sepals (common to it and to *R. hirtifolius*) and the very differently shaped terminal leaflet. This more roundish cuspidate-acuminate terminal leaflet is also one of the characters by which *danicus* is distinguished from typical *hirtifolius*, together with the more hairy under surface of the leaves and the luxuriant panicle with more conspicuously hairy rachis and more showy flowers. The bracts are usually somewhat gland-ciliate, and the pedicels occasionally a little glandular; but generally it seems a more nearly eglandular plant than the type, though that also, like many of its allies, is variable in this respect. The petals are white, and the sepals reflexed in flower, but quickly becoming patent. W.P. Common; Callander, L. Earn, Lake of Monteith,

&c. M.P. Knock of Crieff; a form intermediate between type and var. I have also seen dried specimens collected at Crianlarich in this vice-county, and at Dalmally in A., by the Rev. E. S. Marshall; at two localities in S. by Messrs. Kidston and Stirling; and on the Island of Coll, M. Ebudes, by Mr. S. M. Macvicar; and I think now that a plant collected at Tongue, in W. Sutherland, by Mr. F. J. Hanbury, which I formerly put to my *R. mollissimus*, belongs more probably to *R. danicus*.

R. pyramidalis Kalt. W.P. By L. Earn, a hairy form with long narrow leaflets. M.P. Near Killin; the type.

EGREGII.

R. mucronatus Blox. W.P. Frequent and locally abundant. The type. Callander; about L. Vennachar and L. Earn; Strathyre; near Port of Monteith.

R. MELANOXYLON Muell. & Wirtg. W.P. Fairly common, and seemingly distinct, in spite of considerable variation in armature. Callander Crags; near L. Vennachar and L. Earn; moor between Callander and Port of Monteith. From all these localities, except the last, Dr. Focke has seen my specimens and thus named them, adding, "The species is not well known, and its limits are quite uncertain. Your plant from Scotland, however, is more like the original specimens than anything I met with under this name." A translation of Dr. Focke's brief description of this species (Koch's *Syn. Fl. Germ.* ed. 3) will be found in *Journ. Bot.* 1892, 268, and a fuller account in *Syn. R. G.* 257, 258. It seems nearly allied to *R. mucronatus* Blox. and *R. podophyllus* P. J. Muell., coming between them and the more glandular states of *R. calvatus* Blox., and distinguishable from the two former by its strong larger prickles, more mixed armature, gradually acuminate leaflets, compound panicle, and dark purplish-brown colour of stem and rachis; and from *R. calvatus* by the close even toothing and soft under surface of its more roundish-acuminate terminal leaflet, as well as by the mixed armature. The great range of variation in armature observable in the different bushes of this species is of course characteristic of the group in which we find it; but at times it is so marked as to cause no little difficulty. I have no other British specimens that quite match these Scottish ones; but a plant that the Rev. A. Ley finds at Moseley Mere, Herefordshire, may possibly belong to the aggregate species. Of the Derbyshire plants that have been thus named, Bloxam's from Dovedale is certainly typical *R. radula* Weihe, and I agree with Messrs. Purchas and W. R. Linton in thinking that the Shirley and Edlaston one is more probably a glandular state of *R. calvatus* Blox. Mr. Painter's Staffordshire plant (Horton, and Lask Edge, Biddulph Moor), for which Dr. Focke formerly suggested this name, looks (if I may judge from rather indifferent specimens) as if it would go better to *R. podophyllus* P. J. Muell.; while my very distinct Hants and Dorset plant, described as *R. melanoxylon* by Prof. Babington in *Journ. Bot.* 1890, 133, is *R. melanodermis* Focke.

R. infestus Weihe. W.P. About Callander, in plenty; by

L. Vennachar; between Callander and Aberfoyle, in several places. S. On Castle Hill (in one place); Gargunnock, in good quantity. Everywhere a strong handsome characteristic form.

R. Drejeri G. Jensen. W.P. By Lochs Earn and Vennachar. S. Stirling, on Castle Hill, and among rocks beyond King's Park. Thus named for me by Dr. Focke, with the additional note (in letter), "*R. Drejeri*, I think, is exactly the same plant as the type from Slesvig and Denmark." This is not quite the plant described by me in *Journ. Bot.* 1892, 271, under the same name, then suggested for it by Dr. Focke; that being the *R. Leyanus* Rogers, *Lond. Cat.* ed. 9, 482, a widespread and locally abundant form with us, which appears to be unknown on the Continent. The true *R. Drejeri*, as I have seen it in the living bushes in Scotland, and in dried Slesvig and Holstein specimens of Messrs. Gelert's and Friderichsen's collecting, differs from *R. Leyanus* in its dull-coloured more hairy stem, its chiefly 3-nate leaves and *shortly pointed roundish or obovate leaflets*, with less formal outline *looser toothing and harsher greener under surface*, its much longer and *more cylindrical panicle* with hairier and more densely prickly rachis and broader less attenuate sepals. Thus the shining neat look and yellowish colour so characteristic of *R. Leyanus* give place to a rough shaggy look and dull brownish colour in *R. Drejeri*, and the close alliance between them is by no means striking at first sight. On the other hand, it must be owned, a few of our many widely distributed *Leyanus* bushes (and especially some of the Welsh and S. Devon ones) are in some of these particulars less distinctly different; and so, I think, that form had best be placed as a strongly marked variety under *R. Drejeri*. Whether the typical plant of N. Germany occurs in England as well as in Scotland, I cannot positively say; but a Loxley (Yorks.) specimen that I saw a few months ago (before my visit to Scotland) in the "*R. Newbouldii*" packet in the Cambridge University Museum may, I suspect, represent *R. Drejeri* better than *R. Newbouldii*, as lately understood amongst us. I may add, a very distinct-looking Irish form that I have received from two independent collectors (Revs. C. H. Waddell and H. W. Lett) from Saintfield and Aghaderg, Co. Down, might well rank as a second variety of *Drejeri*, under the name HIBERNICUS, var. n., distinguished from both type and var. *Leyanus* by its *much laxer* and more slightly armed but very glandular and very *long panicle* with straighter prickles and *nearly patent branches*, together with *leaf-toothing remarkably loose and sinuate*, the more prominent teeth being frequently patent or recurved. Its peculiar panicle is as conspicuously narrowed above as in *R. Leyanus*, and its leaflets as long-pointed. The specimens in my herbarium were collected in 1894 and 1895. The confident restoration to our British list of typical *R. Drejeri* and its ally *R. melanoxylon* at the same time and from the same part of Scotland is remarkable.

RADULÆ.

R. radula Weihe. The only species in this large group that I saw in Scotland. Locally abundant, and representing our three best-marked British forms. Typical *radula* :—M.P. Knock of Crieff. S. Castle Hill, Stirling; Gargunnock; plentiful. D. Balloch. Var. *anglicanus* Rogers:—W.P. Not seen growing by me; but my son brought me fresh specimens from the Aberfoyle neighbourhood. Var. *echinatoides* Rogers:—Locally the most abundant form, as seems usual in the north. W.P. Callander; by L. Vennachar; near Lake of Monteith. M.P. Between Killin and L. Tay. S. Gargunnock; in considerable quantity. L. Near Cramond Bridge and the R. Station. In the last locality not quite the usual form. At Gargunnock also a very handsome form rather approaching my var. *raduloides* of *R. anglosaxonicus* Gelert.

Koehleriani.

I saw no well-marked representatives of this group; but at Balloch (D.), by the shore of L. Lomond, occurs in quantity what may be a form of my *infecundus* var. of *R. rosaceus* W. & N.; and on the hill opposite the Crags at Callander and near the Lake of Monteith I saw what seemed a weak form of *R. Koehleri* W. & N., var. *pallidus* Bab.

Bellardiani.

R. britannicus Rogers. W.P. Callander Crags and neighbourhood, in plenty; by L. Earn, and near Lochearnhead R. Station. M. Knock of Crieff; in considerable quantity. S. Castle Hill, Stirling (only one large patch seen for certain). A strong, very handsome bramble in sunny places, and, I believe, a well-marked distinct species. The sole representative of the group that I met with.

Cæsii.

R. corylifolius Sm. (sp. collect.). W.P. By L. Earn. M.P. Near Killin. S. Castle Hill, Stirling; in some quantity, and part of it fairly typical (i. e. *R. sublustris* Lees).

R. cæsius L. (sp. collect.). W.P. By L. Earn; near Callander. M.P. Near Killin. S. Castle Hill, Stirling. L. Near Cramond Bridge.

Of the species and varieties referred to in the foregoing notes, I saw, in July, 1896, either the living bushes or (in the few instances where my son was the sole collector) pieces freshly gathered from the living plant. I add two lists which may be of some interest. In these, where the name of a county or vice-county in brackets follows the name of a plant, it is implied that that is the *only* Scottish county for which the species or variety referred to is known or has been reported.

(1) Other Rubi from Scotland, dried specimens of which I have examined within the last four or five years:—

R. Idæus var. *obtusifolius* Willd.
R. plicatus var. *hemistemon* P. J. Muell.
R. nitidus W. & N. (Westerness).
R. nemoralis var. *glabratus* Bab. (Stirling).
R. gratus Focke.
R. carpinifolius W. & N.

R. macrophyllus var. *Schlechtendalii* Weihe.
R. Sprengelii Weihe.
R. echinatus Lindl.
[*R. ? Newbouldii* (Fife).]
R. thyrsiger Bab., var. (N. Ebudes)
R. rosaceus W. & N.
R. rosaceus var. *infecundus* Rogers (Westerness).
[*R. dumetorum* var. *? diversifolius* Lindl. (E. Ross).]
R. cæsius var. *arvensis* Wallr. (Roxburgh).
R. saxatilis L.
R. Chamæmorus L.

(2) Other Rubi reported from Scotland, but not seen by me, either living or in dried specimens:—

R. sulcatus Vest. (Perth).
[*R. affinis* W. & N. (Perth). Probably *R. Selmeri*.]
R. thyrsoideus Wimm. (S. Aberdeen).
R. macrophyllus var. *amplificatus* Lees.
R. micans Gren. & Godr.
R. Lejeanei W. & N. (M. Perth).
R. rosaceus var. *hystrix* (W. & N.) (E. Perth).
R. rosaceus var. *Purchasianus* Rogers (as "*R. Reuteri* Merc.").
R. Koehleri W. & N.
R. plinthostylus Genev. (Kirkcudbright).
R. hirtus W. & N. (Kirkcudbright).
R. dumetorum var. *tuberculatus* Bab. (Perth).
R. dumetorum var. *fasciculatus* P. J. Muell.
R. corylifolius Sm. var. *cyclophyllus* Lindeb.
R. Balfourianus Blox.

These two lists, added to mine of species and varieties seen by me in July, 1896, leave fifty-five species and thirty-six varieties of British Rubi (as given in *Lond. Cat.* ed. 9) still unrecorded from any part of Scotland.

NOTES ON THESPESIA.

By Edmund G. Baker, F.L.S.

The genus *Thespesia* was first described in print in a paper by Correa de Serra in the *Annales du Muséum d'Histoire Naturelle*, ix. 290 (1807), The name was taken from Solander's MSS., and, as these are in the Natural History Museum, I transcribe a portion of the original description:—

"Novum constitui genus ob calycem exteriorem triphyllum & baccam siccam, hisce ab *Hibiscis* discedit etsi in reliquis fere omnibus partibus fructificationis & habitu congruit. Ab *Hibisco Malvavisco* Linn. cujus fructus etiam baccatus est, nostra differt calyce & seminibus quaternis; a *Malva* & *Malope* quibus calyce convenit fructu distinctissima. Fere ubique ad cœmiteria hoc arbor occurrit forte quasi sacra ibidem plantata; semper enim dum precibus vel pro mortuis vel cum ægrotis Deos suos adorant, illis placandis libamenta offeruntur, inter illa ramuli hujus primum fere obtinent locum. Uti signum pacis seu amicitiæ etiam una cum plantulis *Musæ* rami *Thespesiæ* nostræ porriguntur; sæpe illud nobis apparuit, et quidem dum ad Insulam Otaheite primum accessuri eramus, incolæque nonnulli Insula adhuc e longinquo lintribus suis navem nostram appropinquebant, termetes hujus arboris propinantes, iisdemque primitias nobis adferentes floræ per plagas amœnissimas sceptra florida gerentis. Prima enim hæc erat planta insularum Oceani Pacifici quæ oculis nostris perlustrare licuit."

The species described above is *Thespesia populnea*, founded by Solander on *Hibiscus populneus* L. (*Malvaviscus populneus* Gaertn.); he cites the coloured drawing by Sidney Parkinson in 1769, made from a plant gathered at Otaheite during Cooke's first voyage.

The characters of *Thespesia* are so well known that it seems unnecessary to recapitulate them here. Considerable difference of opinion exists on the limitation of the genus. The type (*T. populnea*) has a scarcely dehiscent capsule, whereas in *T. Lampas* Dalz. the capsule is loculicidally 5- or 4-valved. I have followed Bentham & Hooker in the *Genera Plantarum* in retaining this latter plant and its allies in *Thespesia*, although some authorities, not without reason, consider these species better placed under *Hibiscus*. I append an enumeration of the species, delimiting the genus in the wider sense.

A. Bracts of the involucre obsolete, or 5, oblong-lanceolate, deciduous.

1. T. POPULNEA Soland. ex Correa in *Ann. Mus.* ix. 290, t. 25, fig. 1 (1807); DC. *Prod.* i. 456 (1824); Masters in *Fl. Brit. India*, i. 345 (1875); Beddome, *Fl. Sylv.* t. 63 (1869–73). *Hibiscus populneus* L. *Sp. Pl.* 694 (1753); Cav. *Diss.* iii. 152, tab. 56, fig. 1 (1787); Roxb. *Hort. Beng.* 51 (1814). *H. bacciferus* Forst. *Prod.* 48 (1786); *H. populifolius* Salisb. *Prod.* 383 (1796).

Hab. A widely spread small tree of tropical shores, occurring in Tropical Asia! Pacific Islands! Philippines! Africa! Madagascar! Australia (North, and N. S. Wales), West Indies, and mainland of Central America, possibly naturalized in two latter localities.

β. GUADALUPENSIS DC. *Prod.* i. 456 (1824).

Hab. Guadalupe, perhaps cultivated.

γ. ACUTILOBA, var. nov. Folia parva, acute lobata.

Hab. Africa, Delagoa Bay, *Mrs. Monteiro*!

"A shrub with yellow flowers." Petals 1¼ in. long. Leaves 1¼ in. long, 1½ in. wide, somewhat triangular, base subcordate. Peduncles longer than petioles.

Dr. Pierre, in his *Flora of Cochin China* (Fasc. xi. sub t. 173), describes the three following forms:—

δ. RHEEDII Pierre, *l. c.* Rheede, *Hort. Malab.* i. t. 29. *Malvaviscus populneus* Gaertn. *Fruct.* ii. 253, t. 135 (1791). *Thespesia populnea* Wight, *Ic.* t. 8 (1840). Peduncle shorter or nearly same length as petiole. Fruit nearly spherical. Endocarp inseparable from mesocarp.

Hab. Very common in India. *Herb. Pierre*, No. 3727.

ε. POPULNEOIDES Pierre, *l. c.* *Hibiscus populneoides* Roxb. *Fl. Ind.* iii. 191 (1832). Nerves glandular at the back of the limb. Endocarp separable from mesocarp. Seeds with very short hairs.

Hab. Bengal; Menam, Phu-Quoc, Pulo Condor. *Herb. Pierre*, No. 4866.

ζ. MACROCARPA Pierre, *l. c.* Peduncle longer than petiole. Glands present or absent from back of the limb. Fruit oval. Endocarp fibrous, inseparable from mesocarp. Seeds tomentose, larger than in δ. or ε.

Hab. Island of Phu-Quoc, *Herb. Pierre*, No. 3726.

2. T. MACROPHYLLA Blume, *Bijdr.* 73 (1825). *Hibiscus Blumei* O. Kuntze, *Revisio Generum*, 69.

Hab. Java; New Guinea, *Hollrung*, No. 11. Doubtless occurs elsewhere; Miquel states (*Linnæa*, xviii. 356) that some specimens from Surinam seem to possess the characters.

This plant is founded on a figure of Rumphius (*Herb. Amb.* ii. t. 74). It is closely allied to the preceding, from which it is said to differ by the leaves being 5- instead of 7-nerved, and the peduncle shorter instead of about as long as the petioles.

Thespesia Banalo Blanco *Fl. Filip.* ed. 3, ii. 338 (cum ic.) (1878), from the Philippines, will probably have to be referred to the above. Judging from the figure, the flowers and calyx seem to be larger than those figured by Rumphius.

3. T. GRANDIFLORA DC. *Prod.* i. 456 (1824).

Hab. Porto Rico; Bayamon, *Sintenis*, No. 1050! San German, No. 3937!

Differs from *T. populnea* in the larger calyx (9–10 lines); the leaves are cordate-ovate, not tapering so much to a point, and the peduncles are longer (4–6 in.).

B. Bracts of the involucre 4–8, subulate, deciduous.

4. T. LAMPAS Dalz. ex Dalz. & Gibs. *Bomb. Fl.* 19 (1861): Masters in *Fl. Brit. India*, i. 345 (1875). *Hibiscus Lampas* Cav. *Diss.* iii. 154, t. 56, fig. 2 (1787); Wight, *Ic.* t. 5 (1840). *H. callosus* Blume, *Bijdr.* i. 67 (1825). *H. tetralocularis* Roxb. *Fl. Ind.* iii. 198 (1832). *H. gangeticus* Roxb. ex Wight & Arn. *Prod.* 49 (1834). *Paritium gangeticum* Don, *Gen. Syst.* i. 485 (1831).

Hab. India, from Kumaon eastwards! Bengal! Birma Pegu! Cochin-china! Ceylon! Java! Timor Laut! North Borneo!

Dr. Alefeld, in *Bot. Zeitung*, 1861 (pp. 297–299), proposes the genus *Azanza*, to include three species—*A. Lampas* (*H. Lampas* Cav.); *A. Zollingeri*, described from a plant collected by Zollinger in Java; and *A. acuminata*, from plants collected at Mangalor by Hohenacker. The two latter can, I think only be considered as forms of the preceding, differing in the shape of the leaves and bracts, and, according to Dr. Alefeld, in the pollen.

The *Index Kewensis* reduces *T. Lampas* to *T. macrophylla*.

As pointed out by Dr. Masters (in *Fl. Trop. Africa*, i. 210), it seems doubtful whether the plant collected by Sir John Kirk on the Livingstone expedition at Moramballa can be correctly referred to *T. Lampas*, even as a variety; fruiting specimens are necessary to decide this point.

C. Bracts of the involucre 9–12, subulate, longer than the calyx.

5. **T. trilobata**, n. sp. Arbor alt. 20-pedalis, ramorum apices versus tenuiter stellato-puberulus, foliis coriaceis ovatis sæpissime

palmati-trilobatis lobo medio majore interdum haud lobatis basi subcordatis superne glabris subtus minute pubescentibus reticulato-venosis e basi palmatim 7–9-nerviis, lamina 3–5½ poll. longa, 2½–4½ poll. lata, petiolis tenuiter stellato-puberulis, 1½–2½ poll. longis, floribus axillaribus solitariis pedunculatis, pedunculis super medium articulatis, bracteolis subuliformibus 9–12, subremotis ad basin in cupulum coalitis quam calyce longioribus, sepalis circiter ¼ poll. longis ad apicem truncatis externe ferrugineo-pubescentibus, petalis 1¾–2 poll. longis præcipue ad dorsum pubescentibus, ovario 5-loculare, externe dense hirsuto, loculis 3–4-ovulatis.

Hab. Eastern shore of Lake Tanganyika, near Kareni. "A tree 20 ft.," October (in flower and very young fruit), No. 8356, *G. F. Scott Elliot*!

A tree with branchlets of a greyish colour, towards the extremities stellately puberulous. Leaves coriaceous, of a rather grey or cinereous colour above, generally palmately trilobed, middle lobe longest, except for the lobing, the margin almost entire, occasionally sub-5-lobed or hardly lobed at all, glabrous above, below between the network of veins finely pubescent, palmately 7–9-nerved from the base, the nerves being prominent below, base subcordate. Flowers axillary; peduncles grooved, jointed above the middle, generally 2–2½ in. long. Bracts 9–12, subulate, rather distant from each other, puberulous, forming a cup below. Calyx in bud forming a cup, dividing by fission into generally four sepals, externally ferruginous, stellately pubescent, internally paler, strigose pubescent. Petals thick, pubescent on both sides, but especially on the back, 1¾–2 in. long. Staminal column ¾ in. long. the stamens being given off at a point one-third of an inch from the base, and from thence to the apex. Stigmas confluent, longitudinally stigmatose. Style and stigmas 1¼ in. long, stigmatic portion about ⅜ in. Style pubescent at the base. Ovary externally hairy. Young capsule pointed; loculi 2–3-seeded. Seeds brown.

Our specimens do not show whether or no the capsule is woody when fully developed, but the trunk being 20 ft. high, and the stigmas confluent, show that the plant must be placed in this genus.

Four species of *Thespesia* have already been recorded from Tropical Africa—*T. populnea* Cav., *T. Lampas* Dalz., *T. Danis* Oliv., and *T. Garckeana* F. Hoffm.—to which last the present species is most nearly allied. It differs, however, in its involucral bracts and in the shape of the leaves.

D. Bracts of the involucre persistent, numerous (12–15), linear, acuminate.

6. T. Garckeana F. Hoffm. *Beitr. zur Kenntniss von Central Afrika*, ex Engler, *Pflanzenw. Ost Afrikas*, Theil C, 268 (1895).

Hab. Tropical Africa: Kilimanjaro District, Dschallasee, *G. Volkens*, No. 304! Kitui, Uganda.

E. Bracts of the involucre 3, persistent, ovate-lanceolate, patent.

7. T. Danis Oliv. in Hook. *Icon. Plant.* t. 1336 (1881).

Hab. East Tropical Africa: Nyika, Ribe, also in the Galla

Country. *Rev. T. Wakefield*! Shebele River, *James Thrupp*! Usambara, *Holst*, No. 2376! Duga, *Holst*, No. 3199!

The form collected by Hildebrandt (No. 1929) on Mombassa Island has broader and larger bracts, and the leaves are more rounded at the apex. There is in the Kew Herbarium an allied plant collected by Sir John Kirk in Somali-land, Tola River; the leaves are more lepidote, and the bracts are also broader.

F. Bracts of the involucre 5, persistent, ovate, patent, or somewhat reflexed.

8. T. campylosiphon Rolfe in *Journ. Linn. Soc.* xxi. 308 (1886). *H. campylosiphon* Turcz. in *Mosc. Bull.*, 1858, 193. *H. Vidalianus* Naves in Blanco, *Fl. Filip.* ed. 3, 45, t. 333 (1877–78); Nov. Appendix, 24 (1880). *H. grewiæfolius* Villar, *l. c.* 24, non Hassk.
Hab. Philippines, *Cuming*, No. 1063!

The following species is only known to me from description.

9. T. Rehmanni Szyszylowicz in *Rozprawy i Sprawoz z. Posieden*, xvii. 136 (1888).
Hab. Natal: Ladysmith, *Rehmann*, No. 7128.

Doubtful and Excluded Species.

T. altissima Spreng. *Syst.* iv. Cur. Post. 257 (1827).
= *Neesia altissima* Bl.

T. brasiliensis Spr. *Syst.* iii. 96 (1826).
This, according to Dr. Garcke = *Luhea divaricata* Mart.

T. sublobata Blanco, *Fl. Filip.* ii. 338, t. 51 (1878).
Probably identical with *T. Lampas*.

T. tomentosa Presl, *Reliq. Haenk.* ii. 136 (1835-36). *Hibiscus Preslii* O. Kuntze, *Revisio Generum*, 69.
Hab. Mexico occ.

PLANTS OF TIREE AND COLL.

By Symers M. Macvicar.

The following notes refer to a visit of a fortnight last summer, from June 24th to July 7th, to these islands, which form part of the Mid Ebudes, v.-c. 103. As there does not appear to have been any previous botanical visit to Tiree, some description of the island may be given. It is ten miles long, and has an average breadth of about two and a half miles, one-third being under tillage, the remainder in pasture and waste land. With the exception of three small hills of about 400 ft. in height at the west end, where there are also a few sea-cliffs, the island is very low-lying and flat, a part in the centre being only about 6 ft. above sea-level, though the shore-banks on both sides are 6–12 ft. high. At this place the island was in danger of being cut in two, but last century a barricade of stones,

&c., was erected at the weakest spot. Being so flat, there is no shelter from the Atlantic storms, so that gardens are entirely absent, and most of the native vegetation is dwarfed. Though the remains of former trees were at one time to be found in peat mosses, there are now no trees on the island. The small amount of heather is prostrate, nor could I find any *Rubi*, and the only *Rosæ* seen were three dwarf bushes, clinging to the face of a rock, of "*R. canina* L.," too immature to be determined. The soil is largely sand, which in places, chiefly on the west side, has drifted for some distance inland, and spoiled many acres formerly under cultivation. There is very little peaty soil; what there was at one time has been used for fuel, and the bare rock left exposed. Some peat-loving plants, as *Scirpus cæspitosus* L., were not seen. The sand dunes are mostly covered with *Ammophila arundinacea* Host, among which grow principally *Agropyron junceum* Beauv., *Thalictrum dunense* Dum., *Cerastium tetrandrum* Curtis, and, locally, *Silene maritima* With.; also scattered plants of *Anthyllis Vulneraria*, var. *maritima* Koch, and *Eryngium maritimum* L. Further inland the pasture is very short, and is mainly composed of *Festuca ovina* L., and *Lolium perenne* L., with abundance of *Bellis perennis* L., *Galium verum* L., *Kœleria cristata* Pers., and *Trifolium repens* L., with some *T. pratense* L. *Geranium molle* L., *Medicago lupulina* L., *Trifolium dubium* Sibth., *Daucus Carota* L., and *Antennaria dioica* R. Br. are locally very common; while *Salix repens* L. occurs in quantity over nearly the whole island, and is apparently the only member of the genus present.

There are several lochs on the island, around the edges of which are to be found *Alisma ranunculoides* L., common; *Apium inundatum* Reichb. fil., *A. nodiflorum*, var. *ocreatum* Bab., *Hippuris vulgaris* L., rather common; and occasionally *Œnanthe Lachenalii* C. Gmel. Batrachian *Ranunculi*, especially *R. Baudotii* Godr., are also common. These plants are likewise found at the outlet of streams as they enter the sandy shores, where there are also large masses of *Nasturtium officinale* R. Br., *Veronica Anagallis-aquatica* L., and, more rarely, *Sium erectum* Huds. Among the more interesting plants noticed were *Ranunculus marinus* Fries, the first "satisfactory" specimens Mr. Arthur Bennett has seen from Scotland; *Potentilla reptans* L., growing on sand dunes remote from cultivation; *Erythræa Centaurium*, var. *capitata* Koch, also on sand dunes; *Scilla verna* Huds., *Alisma Plantago-aquatica*, var. *lanceolatum* Afz., *Potamogeton nitens* Web., *P. filiformis* Nolte, *Carex disticha* Huds., *C. flava*, var. *cyperoides* Marsson, the variety being more common than the type.

Coll is also low-lying, but not so level, there being in many places undulating ground, which gives some shelter. There are gardens at several of the cottages, and some young conifers of about 8 ft. in height are growing well at the estate manager's house. A few trees are indigenous on the island; *Betula pubescens* Ehrh., two erect bushes about 6 ft. high; a few small trees of *Populus tremula* L. in fissures of rocks, and still fewer examples of *Pyrus Aucuparia* Ehrh., *Corylus Avellana* L., and *Quercus Robur*

L., the last three being all prostrate. There is much prostrate *Juniperus communis* L., and some *Salix aurita* L. and *S. repens* L. A considerable number of *Rubi* occur, mostly confined to roadsides. Four species were noticed: *Rubus dumnoniensis* Bab. and *R. villicaulis*, var. *Selmeri* (Lindeb.), rather common; *R. plicatus* W. & N., and *R. danicus* Focke, rare. Specimens of these have been named or verified by the Rev. W. Moyle Rogers. A few plants of *Rosa tomentosa* Sm. and "*R. canina* L." also occur. The soil is to a considerable extent peaty, and on this account there are several plants to be found which are apparently absent from Tiree, as *Utricularia minor* L., *U. intermedia* Hayne, and *Rynchospora alba* Vahl. *Calluna* is abundant, and *Erica Tetralix* L., and *E. cinerea* L., are common. Ferns, very scarce in Tiree, are fairly common in Coll, *Lastrea dilatata* Presl seemingly the most plentiful. Part of the west and south shores are bordered with sand dunes in which are many depressions, giving shelter to a most beautiful flora. On the shore itself are found *Cakile maritima* Scop., *Atriplex Babingtonii* Woods, *Polygonum Raii* Bab., *Agropyron junceum* Beauv., and more rarely *A. acutum* B. & S.? A few yards inland is *Ammophila*, with nearly the same vegetation as in Tiree, but more luxuriant, especially in the sheltered depressions, where also occur *Vicia sepium* L., dwarf, with bright-coloured flowers; *Chrysanthemum Leucanthemum* L., as a small-leaved form, and with usually only one stem; *Sonchus oleraceus* L., and *Orchis pyramidalis* L., the last being very rare in Scotland, and this its most northerly known locality in this country. *Ammophila* grows over the greater part of the dunes, but has fewer flowering stems as it extends inland to the less pure sand. At the junction of the dunes and cultivated fields are found *Fumaria confusa* Jord., *Papaver dubium* L., *P. Argemone* L., and *Anagallis arvensis* L. The streams running through the dunes are partly choked with quantities of *Nasturtium officinale* R. Br., and *Veronica Anagallis-aquatica* L., while at the edges grow *Epilobium obscurum* Schreb., *Festuca elatior* L., or *Carex distans* L., the last being always close to the shore. A yard or two of grassy ground on either side of the stream gives room for *Orchis maculata* L., *O. latifolia* L., and *O. incarnata* L. Where the stream joins the shore there is usually to be found *Catabrosa aquatica*, var. *littoralis* Parn. Here also is the most common locality for *Tussilago Farfara* L. In some of the other islands *Petasites* takes its place.

The most noticeable herbaceous plants of Coll which were not observed in Tiree are *Castalia speciosa* Salisb.; *Melampyrum pratense*, var. *hians* Druce, in quantity at the side of a loch; *Orchis pyramidalis* L.; *Potamogeton coloratus* Hornem., an extension of range northwards from the Clyde, I believe; *Scirpus lacustris* L.—in Tiree, where all the lochs are almost at sea-level, *S. Tabernæmontani* Gmel. only is found; *Cladium jamaicense* Crantz, *Aira caryophyllea* L., *Phragmites*, *Carex filiformis* L., *Osmunda regalis* L., and *Equisetum sylvaticum* L. Batrachian *Ranunculi* are scarce in Coll, but common in Tiree. *Anagallis tenella* L. is very common on both islands. No *Hieracia* were seen on either island, except *H. Pilosella* L., on the sand dunes on both. *Drosera rotundifolia* L., and *D. intermedia* Hayne are common to both, the former the more common in Tiree, the latter much the commoner in Coll, occurring locally in abundance, and sometimes as a caulescent form. *D. anglica* Huds. was not seen. Among the Tiree plants should have been mentioned *Plantago Coronopus*, var. *maritima* Gren. & Godr. It is a distinct-looking plant with broad, thick, fleshy leaves when growing. Mr. Arthur Bennett, on naming it as above, remarked, "it is certainly the var. *maritima* Gren. & Godr., *Flore de la France*, vol. ii." It has not been previously recorded from Britain, I believe.

There were 357 species and varieties noticed on the two islands; of this number there were upwards of sixty limited in each case to one island, but another visit will of course alter this relationship considerably. The number of species not previously recorded for the vice-county was about forty, as I am informed by Mr. Bennett, to whom I am greatly indebted for having examined and named several bundles of plants sent to him in the fresh state from both islands.

The *Characeæ* gathered were *Chara fragilis* Desv., and var. *delicatula* Braun, *C. aspera* Willd., and var. *subinermis* Kuetz., also a form approaching var. *curta* Braun, *C. contraria* Kuetz., *C. hispida* L., *C. vulgaris* L., and var. *papillata* Wallr., *Nitella translucens* Agardh, *N. opaca* Agardh, all of which are, I believe, new to the vice-county, with the exception of *C. fragilis.* I am indebted to the Messrs. Groves for having kindly named most of the above.

So far, it seems as if the flora of Tiree, especially, resembled more that of the Outer than that of the Inner Hebrides, at least of those islands from Mull to Skye. Tiree and Coll have in the main the same geological formation (Lewisian gneiss) as the Outer Hebrides, while the islands from Mull to Skye are mainly composed of tertiary basalts, and have their floras corresponding to one another closely; but further searching is necessary before an accurate estimate can be made of the relative effects of geological formation and of latitude.

Since the above was written, the following additional *Characeæ* from Tiree and Coll have been kindly named for me by Messrs. Groves:—*Chara fragilis*, var. *delicatula* Braun; *C. aspera*, var. *subinermis* Kuetz.; also a form approaching var. *curta* Braun; *C. contraria* Kuetz.; *C. hispida* L.; *C. vulgaris*, var. *papillata* Wallr.

SHORT NOTES.

New Fungal Disease of Rape. — A few weeks ago I was sent some leaves of rape, extensively diseased, from near Tullamore, King's Co. These leaves were covered with pallid spots, about a third of an inch in diameter, but usually becoming confluent, and so forming much larger patches. In these the parasite had almost entirely destroyed the chlorophyll, rendering the part nearly or quite transparent. Microscopic examination revealed numerous long slender conidia, at once suggesting *Ramularia ;* but as none of the species described in Saccardo's *Sylloge* seemed to agree with the present form, and as none were described as being parasitic on rape, I forwarded specimens to Mr. Massee, who considers it "a typical *Ramularia*, but there is no described species that agrees with it, which I should have no hesitation in considering a new and very fine species." I accordingly venture to describe it as new. The only species of *Ramularia* parasitic on Crucifers are those on *Cochlearia* and *Armoracia*, and they differ markedly from the present species.

Ramularia rapæ, sp. n. Spots irregular, soon coalescing into large patches, pallid, transparent. Hyphæ scarcely distinguishable; conidia fasciculate, very long and slender, slightly curved, obtuse, 40–60 μ by 1–2 μ, usually triseptate, hyaline. The chief characteristic is the extreme length and slenderness of the conidia. Type specimens have been sent to the Herbaria at the British Museum and Kew, and to the National Museum, Dublin.—Greenwood Pim.

Euphrasia Salisburgensis Funk, in Galway.—In August, 1892, while botanizing in the rough limestone country by the south-eastern shore of Lough Corrib, near the little village of Menlough, we noticed a curious-looking *Euphrasia*, and collected a few specimens of it. These were sorted away and forgotten until recently, when, having occasion to turn through our *Euphrasia* cover, we were struck by their resemblance to Mr. Townsend's figure and description of *E. Salisburgensis* in this Journal for 1896 (p. 442, t. 363). We have forwarded specimens to Mr. Townsend, who writes:—"They are more typical than the Mayo plant gathered by Mr. Marshall; bracts narrower; teeth longer, more patent, and aristate. The finding of this species in another county is a very valuable confirmation of *Euphrasia Salisburgensis* Funk being native in Ireland."—H. & J. Groves.

Hypericum linarifolium in Carnarvonshire. — In his recently published (but undated) *Flora of Anglesey and Carnarvonshire*, Mr. J. E. Griffith apparently refuses to admit the claim of *Hypericum linarifolium* Vahl to rank as a Carnarvonshire plant, as he omits it from the "List of Species not recorded in Watson's *Top. Bot.* for Carnarvonshire." In the text (p. 28) he says of it: "This plant is stated in the *Journal of Botany*, June, 1889, to have been found on a rocky bank at the angle of the road to Bodfean from Pwllheli. Mr. J. Ll. Williams has searched the place carefully in 1889, and I have been there in 1891, but neither of us could find it." I am much surprised at the failure of Mr. Williams and Mr. Griffith to find the plant at the spot indicated, for although, when I discovered it on July 19th, 1888, it was by no means abundant, yet it certainly was in sufficient quantity to render its accidental eradication extremely unlikely, and, as a matter of fact, it did not disappear, for on July 23rd, 1894, five years after I first found it, Mr. G. Goode, of Cambridge, visited the locality and readily found the plant in exactly the same place. He gathered some fine specimens, one of which he sent to me. As there can hardly be any doubt of the nativity of this species in such a remote spot, I think it will be admitted that *H. linarifolium*—to my mind one of the most interesting constituents of the Carnarvonshire flora, owing to the remarkable extension given to its range in Great Britain by its occurrence in North Wales—has a very much stronger claim to be regarded as a native of that county than Mr. Griffith seems willing to allow.—J. W. Carr.

[As Prof. Babington stated in his note (*Journ. Bot.* 1889, 185), one of the specimens originally collected by Mr. Carr is in the British Herbarium of the Natural History Museum. Mr. Griffith's *Flora* was published in 1895.—Ed. Journ. Bot.]

NOTICES OF BOOKS.

Flora of Syria, Palestine, and Sinai. By the Rev. G. E. Post, M.A., &c., Syrian Protestant College, Beirut, Syria. 8vo, pp. 919, figg. 441, map. Price £1 1s. 0d., post free from the Author, as above.

There are many who will welcome this handbook, the cheapness of which is remarkable. The English-speaking traveller in Palestine who possesses some smattering of botany, as well as the home student who finds it convenient to have at his elbow some compendious and not too costly summary of the flora of any region of interest, will be grateful to Dr. Post for this work, which has been produced, as his preface informs us and as we can readily believe, under circumstances of considerable difficulty. The formation of a herbarium, the undertaking of numerous and costly journeys, can have been no trifling addition to the work of a man whose time was already fully occupied; and it was rendered more difficult, although that difficulty was partly overcome by the help of brother botanists more fortunately situated, by the absence of any large reference library—an indispensable adjunct, one would have thought, to the satisfactory carrying-out of such an undertaking. "The printing, which has been achieved in spite of the limited typographical resources of the Mission Press, has been a labour of no trifling magnitude"; "the task of drawing most of the illustrations, and superintending the execution of the woodcuts, has fallen on him." Dr. Post trusts that "a lenient judgment will be passed on imperfections"; but it seems to us that these, where they exist, are but few, in comparison with the interest and importance of the contribution to the Flora of the Mediterranean region for which he has made us his debtors.

The district embraced by the book extends from the Taurus to Ras Muhammad, and from the Mediterranean to the borders of the Syrian and Arabian Desert. The volume begins with an introduction—or, more strictly, with the somewhat numerous "addenda," consisting mainly of plants which have been discovered since the printing of the Flora was begun in 1883. Then comes a general analytical key to all the orders; special keys are also provided to the larger tribes and genera. The species, to the number of nearly

3500, are carefully described; "many of the latter," says the prospectus, "are new to science." In connection with these we fear some difficulty may arise, as it is not clear what meaning Dr. Post attaches to "sp. nov." For example, on reading "*Statice palmyrensis*, sp. nov.," one would think that plant was here first published; but following the name is a reference to "Plantæ Postian. fasc. iii. p. 16"—in which pamphlet the species was included in 1892. It is hardly fair to demur to the omission of bibliographical references to the species, but we think the author might have been more explicit as to his own discoveries. "*Atriplex Amanum* Post," for example, may either be a novelty here first published, or a species previously described by him elsewhere; and numerous species are in this doubtful condition, notably among the addenda. The Jackson of the future will need to examine the volume carefully, lest he should overlook some of the novelties.

Such Scriptural plants as can be identified with any degree of certainty are noted in the text; and the Arabic names, even the most trivial, have been carefully collected. The descriptions of the species seem to have been drawn up with care, mostly from living specimens; the distribution of each is briefly but sufficiently indicated.

The cuts are the least satisfactory feature of the book. Allowance must of course be made for the difficulties attending their production, but it seems to us that they are selected on no principle, and many of them are of very slight value. They must have added considerably to the cost and trouble of production, without, as it seems to us, adding materially to the usefulness of the book. But Dr. Post is entitled to the thanks of botanists for this cheap and convenient enumeration, and we trust that its sale will in some measure compensate him for the time, trouble, and cost which he has expended upon it.

J. B.

The True Grasses. By Eduard Hackel. Translated from *Die Natürlichen Pflanzenfamilien* by F. Lamson Scribner & Effie A. Southworth. Westminster: Constable. 1896. 8vo, pp. viii, 228, tt. 110. Price 10s. 6d.

Everyone who works seriously at Grasses knows Eduard Hackel as the greatest living authority on the subject, and knows that his account of the order in Engler & Prantl's *Pflanzenfamilien* is the best and most scientific which has hitherto appeared. We wish for the credit of the English publisher that that were the extent of the student's knowledge. But anyone who preferred an English translation has had it within his reach for the past six years. A botanist who is particular as to the shade of green in which his books are bound, or who prefers somewhat stouter boards, will welcome Messrs. Constable's "new" and extensively advertised volume. He who is not so fastidious will stick to Messrs. Holt's publication of 1890. When we received by the penny post the announcement of this "new" work, we expected at least an edition brought up to date, which would take note of recent and important contributions to agrostology by workers in our own country. We certainly had a right to expect something beyond a re-issue of the old sheets with a slightly different binding—for such is the book now under review. If the transfer of the sheets from a New York to a London house means that the translation was selling badly because English workers are quite able to use the German original, we are glad; for the sooner our systematists recognize the fact that ability to read German is an essential towards good work, the better for them and the better for botany. A translation, under such circumstances, is an *édition de luxe*, a weakness for which may be pardoned. To the wealthy and extravagant, who possess not the American issue, we would heartily recommend the one in question at the present moment.

"True Grasses" are what we understand by the natural order *Gramineæ* of Bentham & Hooker's *Genera Plantarum*, and the arrangement adopted by Bentham in that work is the basis of Hackel's system. After the number of each genus, the translators insert its number in Bentham's arrangement. This facilitates reference, and shows the diversity between the two systems. It also shows what a very excellent piece of work Bentham's was, considering the material at his disposal, and the confusion in which he found this most difficult of orders. For it is surprising to note what a great amount of agreement there is in the limitation of genera in the two cases. As Sir Joseph Hooker points out in his introductory remarks to the *Gramineæ* of the *Flora of British India*, it is in the reduction of species and the working out of synonyms that the student of the family will find that his work chiefly lies, and the painstaking manner in which this has been done in the two recently published portions which form the completion of the Indian "Flora" make the monograph of *Gramineæ* perhaps the most valuable in the whole work.

A. B. R.

*ARTICLES IN JOURNALS.**

Ann. Scottish Nat. Hist. (Jan.). — J. W. H. Trail, 'Florula of waste ground at Aberdeen.'—A. Bennett, '*Juncus tenuis* in Westerness.'—S. M. Macvicar, 'Flora of Eigg.'

Bot. Centralblatt (No. 1). — S. Ikeno, 'Vorläufige Mittheilung über die Spermatozoiden bei *Cycas revoluta*.'—(Nos. 1–3). W. Futterer, 'Zur Anatomie und Entwickelungsgeschichte der *Zingiberaceæ*.'—(Nos. 2–3). S. Hirase, 'Über das Verhalten des Pollens von *Ginkgo biloba*.' — (Nos. 2–4). E. Küster, 'Die anatomischen Charaktere der Chrysobalaneen' (1 pl.).

Bot. Gazette (Dec. 24). — B. T. Galloway, 'A rust and leaf casting of pine leaves' (2 pl.). — L. H. Bailey, 'The Philosophy of

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Species-making.'—J. C. Arthur, 'Laboratory apparatus in vegetable physiology' (2 pl.). — F. D. Bergen, 'American Plant-names.'—C. V. Piper, 'New Washington Plants.' — Id., 'Another Compass-plant' (*Wyethia amplexicaulis*).

Bot. Zeitung (Jan. 16). — H. Solms-Laubach, 'Ueber *Exormotheca* Mitten, eine wenig bekannte Marchantiaceengattung.'

Bull. de l'Herb. Boissier (Dec.).—H. Schinz, &c., 'Beiträge zur Kenntnis der Afrikanischen-Flora' (cont.). — J. Briquet, 'Fragmenta Monographiæ Labiatarum' (concl.). — R. Chodat, 'Sur la Flore des neiges du Col des Écandies' (1 pl.). — Id., 'L'action des basses-températures du *Mucor Mucedo*.' — Id., 'Polygalaceæ novæ parum cognitæ.'

Bull. Torrey Bot. Club (Dec. 28). — E. G. Britton, Rusby's Bolivian Mosses. — C. MacMillan, 'Formation of Circular Muskeag in Tamarack swamps' (3 pl.). — E. P. Bicknell, 'N. American species of *Agrimonia*' (2 pl.).—Id., '*Geum Canadense flavum* a valid species.' — L. M. Underwood, 'Terminology among the orders of Thallophytes.' — T. F. Allen, New species of *Nitella* (3 pl.).—G. McCloskie, 'Internal Antidromy.'

Erythea (Dec. 19).—W. A. Setchell, 'The Elk-Kelp' (*Nereocystis gigantea*; 1 pl.).—Id., 'Notes on *Cyanophyceæ*.'

Gardeners' Chronicle (Jan. 23).—*Bulbophyllum Ericssoni* (fig. 16).

Journal de Botanique (Dec. 16). — R. Chodat, 'Sur la structure et la biologie de deux Algues pélagiques' (concl.). — A. Franchet, 'Compositæ novæ' (cont.). — E. Roze, '*Amylotrogus*, gen. nov.' (Myxomycetes). — (Jan. 1). E. Drake del Castillo, 'Les Araliées des îles de l'Afrique occidentale.'—C. Sauvageau, 'La sexualité des Phéosporées' (cont.).—E. Bonnet, 'Le Haricot avant la découverte de l'Amérique.'

Oesterr. Bot. Zeitschrift (Jan.).—W. Lipsky, *Euphorbia soongarica* auf der Balkan-halbinsel.' — K. Fritsch, '*Saponaria Wiemanni* (*cæspitosa* × *lutea*).'—A. Waisbecker, 'Flora des Eisenburger Comitates.'—F. Bubák, 'Zur Pilzflora der Umgegend von Hohenstadt in Mähren.' — L. Dergane, 'Zwei vielverkannte *Crocus*-Arten der Krainer Flora.'—F. J. Slavicek, 'Morphologische Aphorismen über einige Coniferen-Zapfen' (concl.).

BOOK-NOTES, NEWS, &c.

THE dearest publication we have seen is No. 12 of Mr. Christy's *New Commercial Plants and Drugs*, which deals with *Dimorphandra Mora*. It consists of six pages (without wrapper); the first is occupied by the title, on the back of which is a plate; then follow 3½ pages of letterpress. The plate is adopted from the figures published in *Trans. Linn. Soc.* vol. xviii., and about half of the letterpress is reprinted from the description in the same place. Mr. Christy says, "in the library of the Linnean Society I discovered (!) that a paper had been read," &c., but he omits any reference to its place of publication. The only additional information supplied by the author is that the "nuts" of the *Dimorphandra* appeared in commerce last year as "kola nuts." Mr. Christy is "continuing the research with the hopes of being able to find that the *Dimorphandra Mora* contains some food product which may be turned to account. Perhaps," he adds, "I may receive this before this paper is printed." But he didn't, and we may be allowed to wonder why the paper was printed at all, and still more why a shilling should be charged for it.

A Parliamentary paper has just been issued regarding a new food for cattle—a compound of molasses and peat powder—which has been perfected in Germany. The latter ingredient, we are informed by the *Daily Graphic* of Jan. 15th, is obtained from "the dried roots of the familiar mosses 'sphagnum cuspidatum' and 'eriophorum latifolium.'" *Sphagnum* has no roots, and *Eriophorum* is hardly a moss.

Moss-students will note with satisfaction the appearance of Part xvii. of Dr. Braithwaite's *British Moss-Flora* (London: 303, Clapham Road, S.W. pp. iv, 36; tabb. 85–90. Price 6s.), in which is begun the consideration of the pleurocarpous mosses. The first family treated—*Hypnaceæ*—is a difficult one to arrange satisfactorily, owing to the strong family likeness prevalent among its members; and the generic systems adopted by authors have varied between the one extreme of condensation into a single genus to the other extreme of disruption into scores of genera often separated from one another on the flimsiest of pretexts. Dr. Braithwaite, it appears, will follow a middle course. The present part contains the subfamily *Leskeæ* (*Thuidium* with six species, *Leskea* with three, *Anomodon* with three), and part of *Amblystegium*—the beginning of subfamily *Hypneæ*. *Amblystegium* has been vastly augmented by the addition of five groups of *Hypna* (e. g. *Harpidium* and *Limnobium*). In the present part, however, beyond the thirteen species of *Euamblystegium*, only one of the additional groups appears—*Campyliadelphus*, with five species. To return to *Thuidium*, Dr. Braithwaite is to be congratulated for repairing an omission of which other books and lists of British Mosses are guilty. He has not failed to include in the genus *T. hystricosum* Mitt., which was published in this Journal in 1863. Wilson separated the plant in his herbarium under the manuscript name *Hypnum calcicola*; but Mitten's name seemed to have become forgotten. Husnot, however, just mentioned it in his *Muscologia Gallica*, and Limpricht acknowledged and redescribed it in Rabenhorst's *Kryptogamen-Flora*. As to another species of *Thuidium*, it will be fresh in the memory of readers that in the last number of this Journal *T. Philiberti* Limpr. was recognized by Mr. H. N. Dixon as a species which he has found in this country. This notice was, however, too late for Dr. Braithwaite to figure the plant in the newly published part of his *Moss-Flora*.—A. G.

Another important contribution to the literature of Mosses is Part iii. of General Paris's *Index Bryologicus* (Paris: Klinksieck. Dec. 1896. pp. 645–964. Price fr. 12·50). Beginning with *Hypnum* *grimsulanum*, it makes such good progress that it reaches *Plagiothecium nitidulum.* The most valuable achievement in the present part is the completion of the index of the species of *Hypnum* which have always been difficult to trace owing to the vast number of names in use, and the perplexing and ever-changing systems in which they have been classified. It is to be hoped that we have now a trustworthy clue to the synonymy and literature of the genus.—A. G.

Owing to an accident, as we learn from Prof. Britton, we have only just received our exchange copy of the *Bulletins of the Torrey Club* from May last, the absence of which has prevented their inclusion in our list of "Articles in Journals." We mention this because our erroneous but not unnatural conclusion, based upon a similar failure of exchange, that *Erythea* had ceased to appear, has occasioned some comment, not of the most courteous kind, in our transatlantic contemporaries. Dr. Britton says (*Torrey Bulletin*, 1896, p. 283) that our statement was "about as accurate as [our] recently printed tabulation of the dates of the publication of the Bulletin during 1895"—thereby implying that both statements were equally inaccurate.

There can be no doubt as to which *Bulletin* he intends, for Dr. Britton prints the word in small capitals; and he may perhaps be excused for recognizing no other *Bulletin* than his own. "Such pride," like that of Lieutenant Belaye in the *Bab Ballads*, "is hardly wrong"; yet if the accomplished editor had not been in such a hurry to criticize, or had taken the trouble to read the article which he censures, he would have seen that the "tabulation" refers, not to his journal, but to the *Bulletin of Miscellaneous Information* issued at irregular intervals in connection with Kew Gardens. This tabulation, as we then pointed out, is based on the Stationery Office date printed on each number, and cannot be otherwise than accurate. No doubt Dr. Britton will be as ready to withdraw his misstatement as we were to correct ours regarding *Erythea*.

We note that Dr. Britton (*Torrey Bulletin*, 1896, 215) commends Mr. Druce's 'Notes on the Ninth Edition of the London Catalogue' as "critical and valuable," and quotes "a few sentences in order to show that Mr. Druce is sound on principles of nomenclature." We do not observe that Dr. Britton has subsequently modified this opinion; probably he has not noticed the criticisms of Mr. Arthur Bennett and the Rev. E. S. Marshall (*Ann. Scott. Nat. Hist.* April, 1896, pp. 109–112) or our own examination of Mr. Druce's paper in this Journal (1896, pp. 271–3). Those who have read either of these notices will be able to form their own opinion as to the critical value and soundness of the procedure which is thus stamped with the approval of the great American reformer of nomenclature.

The *Proceedings* of the Somersetshire Archæological and Natural History Society for 1896 (3rd series, vol. ii.) contains the completion of the Rev. R. P. Murray's *Flora of Somerset.* Our readers will be glad to know that the Rev. E. S. Marshall has begun to write out his *Flora of Kent* for press.

HIGHLAND PLANTS COLLECTED IN 1896.

By Rev. E. S. Marshall, M.A., F.L.S., & W. A. Shoolbred, M.R.C.S.

We stayed in the comfortable hotel at Roy Bridge, v.-c. 97, W. Inverness, from July 15th to August 6th, chiefly in order to collect Hieracia, W. A. S. during a previous visit having found it to be a good centre for working; several of the stations given below were then discovered by him. Glen Spean has been botanized by members of the Scottish Alpine Club, Mr. G. C. Druce, and others, so that some of the plants noted have no doubt been previously found; therefore we have not attempted to discriminate "new county records." Part of a day was spent on Ben Dothaidh, v.-c. 98, Argyle. Former hunting-grounds (Corrie Ardran and Glen Falloch) were again visited from Crianlarich, v.-c. 88, Mid-Perth: and we gathered some brambles during an afternoon stroll near Ardlui, at the head of Loch Lomond, v.-c. 99, Dumbarton.

With his never-failing kindness, Mr. Arthur Bennett has examined various critical plants. Mr. Hanbury and Rev. E. F. Linton gave us much help with the hawkweeds, and Rev. W. Moyle Rogers with the brambles. We have also to thank Prof. Hackel, Mr. Townsend, and Dr. O. Nordstedt, who was good enough to submit two or three difficult forms to Swedish specialists.

Cochlearia alpina H. C. Wats. A form with the pouches globose or orbicular-ovate was met with on Aonach Beg, 97, a magnificent mountain, which is very remote, and would require fully two days for the proper examination of its corries. We are much indebted to the Earl of Abinger and Mr. R. Kynaston Cross for access to this and other hills sacred to the deer. — *C. micacea* E. S. Marshall. Micaceous ravine on Aonach Beg, at 3200 ft. The pods were not ripe, but its habit is exactly that of the Perthshire type. A scurvy-grass growing in some quantity on the shore near Fort William does not agree at all well with any one of our British species, though bearing considerable resemblance in particular points to *anglica*, *alpina*, and *officinalis*; we hope to raise it from seed. Specimens were sent to Prof. Th. M. Fries through Dr. Nordstedt, but no opinion has yet been received from him.

Viola tricolor L. A peculiar hispid variation is frequent in Glen Spean, about Roy Bridge, making a considerable approach towards *V. hispida* Lam. (*V. rothomagensis* Desf.) in this respect, and in the cutting of the stipules, but not having quite the corolla of that plant. — *V. lutea* Hudson, var. *amœna* (Symons). Glen Spean, between Tulloch and Inverlair.

Polygala vulgaris L. Shingles of the Spean, below Tulloch.

Cerastium triviale Link. A striking variety, with bright green foliage, umbellate inflorescence, and long capsules, locally abundant in wet, stony ground on Aonach Beg, at about 2700 or 2800 ft., has been named by Dr. Svante Murbeck as follows:—"*C. vulgare* Hartm. subspec. *fontanum* Baumg. (= *C. triviale* Link, subsp. *alpestre*

Lindblom = *C. macrophyllum* Schur)." Nyman places *C. macrocarpum* (an earlier synonym of *C. longirostre* Wichura) as a subspecies of *C. triviale.* Our plant is certainly not the variety d. *alpinum* Mert. & Koch of the present *London Catalogue*, which used (rightly or wrongly) to be called var. *alpestre* Lindbl.—*C. alpinum* L., var. *pubescens* Syme. Fine and characteristic on Stob Coire-an-Easain, Glen Spean, above 3400 ft., associated with *C. arcticum* Lange; the latter also grows on the adjoining Ben Socaich range. *C. trigynum* Vill. was seen on Aonach Mor, Aonach Beg and Stob Coire-an-Easain.

Anthyllis Vulneraria L. Glen Roy.

Lotus uliginosus Schkuhr. Glen Spean, near Roy Bridge.

Vicia sylvatica L. At 1300 ft. on the rocky banks of the main stream in Coire Coille, Glen Spean; flowers almost pure creamy-white. Mr. Bennett writes that it "seems to differ from the normal form by the ciliate calyx, more subulate sepals, and the great development of the tendrils."

Prunus Avium L. Roy Bridge; probably bird-sown, rather than planted.—*P. Padus* L. Banks of the Spean, near Roy Bridge.

Rubus fissus Lindl. and *R. suberectus* Anders. Both remarkably abundant about Roy Bridge. *R. plicatus* is much scarcer; a plant growing close to the railway-station, of which we unfortunately omitted to take specimens, had stamens falling short of the styles, and may be var. *hemistemon.* — *R. Lindleianus* Lees. Ardlui, 99.—*R. pulcherrimus* Neum. Fort William; Ardlui. — *R. villicaulis* Koehl. Roy Bridge. Mr. Rogers named this as var. *insularis*, but from a recent letter of his it seems that Dr. Focke considers Areschoug's variety to be the typical Silesian plant. What we have recently been regarding as typical *villicaulis* (from Ross and Sutherland) appears identical with the usual German form, the stems of which are more hairy than in Koehler's original specimens.—*R. Selmeri* Lindeberg. Abundant in Glean Spean; also observed at Fort William and Ardlui. This, one of the most marked and widely distributed British brambles, surely deserves specific rank, apart from *R. villicaulis.* — *R. gratus* Focke. Near Ardlui.—*R. macrophyllus* Wh. & N. (sp. coll.). Roy Bridge.—*R. mucronatus* Blox. Plentiful in Glen Roy and Glen Spean; also gathered near Ardlui.—*R. infestus* Whe. Fort William.—*R. radula* Whe. Both the type and a form of var. *anglicanus* Rogers were collected at Ardlui.

Potentilla procumbens Sibth. Near Tulloch, Glen Spean.

Alchemilla arvensis Scop. Fields, Glen Roy.

Rosa tomentosa Smith. A variety with leaves very glandular beneath is frequent in Glen Spean and Glen Roy; in one case the glands extended on to the upper surface as well. About a mile below Roy Bridge we met with the smooth-leaved variety formerly named *R. mollis* var. *glabrata* Fr. by Scheutz, on which M. Crépin remarks: "C'est certainement une des curiosités rhodologiques du nord de l'Écosse." *R. glauca* Vill. and *R. coriifolia* Fr. are both fairly common about Roy Bridge.

Pyrus Malus L., a. *acerba* DC. Glen Roy; looking like a native.

Saxifraga nivalis L. Stob Coire-an-Easain, at 3400 ft., associated with *S. rivularis* L., which also grows on Aonach Beg.—*S. cæspitosa* L. The true plant was obtained on one of the Glen Spean mountains, very scarce and small; we believe that the locality is one in which it was met with by some Scottish botanists a few years ago.

Epilobium angustifolium L. At 2700 ft. on Garbh Bheinn, Fersit Forest, 97; not seen elsewhere.

Circæa alpina L. Glen Roy.

Carum verticillatum Koch. By Loch Lomond, at Ardlui.

Senecio viscosus L. Corrour, 97; Bridge of Orchy, 98; Crianlarich (in great plenty), 88; and Ardlui, 99; growing in each case on cinders or other railway *débris*, and unquestionably introduced.

Hieracium alpinum L. Aonach Mor and Ben Socaich, 97; locally abundant in the second station. — *H. holosericeum* Backh. Frequent on the hills about Roy Bridge. Ben Chlinaig; Garbh Bheinn; Stob Ban; Stob Coire-an-Easain More; Aonach Beg; Ben Socaich, &c.— *H. eximium* Backh. Most rare; a single specimen only was gathered on Aonach Mor. Its place is taken by *H. calenduliflorum*, which is far more general and abundant than in any district that we have ever visited. Fersit Forest (descending to 1700 ft.): Coire-an-Easain More (very plentiful); Stob Ban; Coire Coille; Aonach Mor; Aonach Beg, &c. — *H. gracilentum* Backh. Very sparingly on the top of Ben Chlinaig, 97. Ben Dothaidh, 98.—*H. nigrescens* Willd., var. *gracilifolium* F. J. Hanb. Aonach Beg; scarce. Glen Falloch; "Just like the original Ben Lawers specimens" (Hanbury *in sched.*). — *H. atratum* Fr. Ben Socaich. An Aonach Beg plant may also belong here, and we refer to this species a hawkweed found in some quantity, at 2800 ft., in Glen Falloch. — *H. curvatum* Elfstrand. Aonach Mor, locally abundant. Seen sparingly on Aonach Beg; but time only allowed us to examine a small part of this mountain.— *H. Backhousei* F. J. Hanb. Ben Socaich, in considerable quantity. — *H. lingulatum* Backh. Frequent.—*H. senescens* Backh. Frequent, and abundant in several of its stations. Aonach Beg; Garbh Bheinn; Stob Ban; Coire Coille; Stob Coire-an-Easain More. — *H. chrysanthum* Backh. Almost as general and locally plentiful as *H. calenduliflorum*, in the Glen Spean mountains. Garbh Bheinn; Stob Coire-an-Easain More; Stob Ban; Ben Socaich; Aonach Beg. A plant from Ben Socaich has been named var. *microcephalum* Backh. by Mr. Hanbury.—*H. centripetale* F. J. Hanb. Coire-an-Easain More, at 2700 ft.; Aonach Beg, at 3000 ft. Very scarce in both these stations.—*H. submurorum* Lindeberg. Aonach Beg, very rare; more plentiful by streamlets descending from Stob Ban. — *H. callistophyllum* F. J. Hanb. Stream-sides, Coire Coille; Stob Ban. Var. *cremnanthes* F. J. Hanb. occurs with the type in Coire Coille, and is rather plentiful near the head of Glen Falloch, Perthshire.—*H. anglicum* Fr. Var. *longibracteatum* F. J. Hanb. is the prevailing form about Glen Spean; typical *anglicum* was only noticed in two stations, and *H. iricum* Fr. must be extremely rare; indeed, we did not meet with a single specimen of it. — *H. cerinthiforme* Backh.

Locally abundant; Sgorr-na-Insse, Glen Spean; Coire Coille; Fersit Forest.—*H. flocculosum* Backh. Aonach Beg, between 2500 and 3000 ft.; Coire-an-Easain More. Very scarce.— *H. Langwellense* F. J. Hanb. (?) A plant which, when dried, seems to us indistinguishable from type-specimens of the above, was gathered in quantity by the stream descending into the Lairige-an-Leacan from Stob Ban, and more sparingly in Coire-an-Easain More and Coire Coille.— *H. argenteum* Fr. Glen Spean, near Inverlair; scarce.— *H. nitidum* Backh. Lairige-an-Leacan and Coire-an-Easain More (W. A. S., 1891). — *H. Sommerfeltii* Lindeberg. Coire-an-Easain More; Stob Ban. A plant with unspotted leaves, from shingles by the Spean below Tulloch, is (we believe rightly) placed here by Mr. Hanbury. —Var. *tactum* F. J. Hanb. Ascent of Aonach Mor; fairly plentiful, between 1800 and 2000 ft.—*H. Pictorum* F. J. Hanb. Aonach Beg; ascending to 3000 ft. Mountain (not named in the ordnance-map, but probably Ben-na-Van) west of the Lairige-an-Leacan. Head of Glen Falloch (2700 ft.).—Var. *dasythrix* Linton. Aonach Beg; Coire Coille; Stob Ban, 97. Ben Dothaidh, 98. Head of Glen Falloch. A good and well-marked variety, usually growing mixed with the type; separable by its yellow styles, more dingy pappus, and more shaggy heads. — *H. rivale* F. J. Hanb. Apparently quite common on the Glen Spean mountains, the name being applied in a wider sense than usual; but we find it difficult to consider all the plants grouped under it by Mr. Hanbury as properly referable to one species. Stob Ban; Coire Coille, very plentiful; Garbh Bheinn; Coire-an-Easain More; Glen Falloch (2700 ft.). — Var. *subhirtum* F. J. Hanb. By streams descending from Stob Ban to the Lairige-an-Leacan, in good quantity.— *H. murorum* L., var. *sarcophyllum* Stenstrup. By streams, rather uncommon and scarce, between 400 and 2500 ft. Beside the Roy, two or three miles up the glen; Stob Ban; Garbh Bheinn; Coire Coille. The leaves were blotched with dark purple in all the specimens observed. — *H. eupreces* F. J. Hanb. Scarce. Aonach Beg. A form with fairly typical heads, but peculiarly toothed root-leaves, was found by the main stream descending from Aonach Mor into Glen Spean, at 1500 ft. — *H. cæsium* Fr. A plant from Coire-an-Easain More (2700 ft.), having yellow styles, is placed here by Mr. Hanbury.—*H. insulare* F. J. Hanb. Coire Coille, at 2500 ft.; not quite typical.— *H. stenophyes* W. R. Linton, "or very near it" (Hanbury *in litt.*). Plentiful in a porphyritic gully on the north side of Sgorr-na-Insse, Glen Spean. — *H. subanfractum* E. S. Marshall. Stream-side, Fersit Forest; locally abundant. Streams descending to the Lairige-an-Leacan, on the west side. — *H. sparsifolium* Lindeberg. Glen Spean, near Inverlair; both the unspotted and the more usual Scottish plant ("forma *cruentata*" Lindeb.) with purple-blotched or marbled leaves. — *H. dovrense* Fr. Bushy places, Glen Roy; in some plenty, but very local. — *H. Dewari* Boswell. By the Spean at Roy Bridge, very scarce. Locally abundant by the burn in Coire Coille, from 1300 to 1500 ft. —*H. strictum* Fr. (type). In the last-mentioned locality, above 1500 ft. — Var. *subcrocatum* Linton. Very abundant in Glen Roy, and frequent by the Spean at (and below) Roy Bridge; usually occurring as a *stylose* form. We incline to consider this rather a good "species," and cannot think it rightly placed under the same aggregate as var. *amplidentatum* F. J. Hanb., which differs widely in habit, shape, colour and texture of leaves, styles (yellow, not sooty), and involucral clothing. The latter is abundant at intervals by the Spean from near Tulloch to within a mile of Spean Bridge, below which point we did not work. — *H. angustum* Lindeberg. To this Mr. Hanbury refers a handsome and characteristic yellow-styled plant, abundant by the Spean at Roy Bridge and about a mile lower down. We place it with some confidence under *H. salicifolium* Lindeberg; it does not at all closely resemble either Prof. Lindeberg's type-specimen of *angustum* in *Hier. Exsiccata Scand.* or a specimen gathered at Lawers, Perthshire, in 1887, which he named "*H. angustum* mihi, optimum!" The leaves are much broader, more coriaceous, less narrowed above the base, less hairy, and more shortly ciliate; indeed, the whole facies of the Glen Spean plant, which (in hundreds of specimens seen) was remarkably uniform, appears to us decisive against the former identification. — *H. auratum* Fr. Plentiful in Glen Spean and Glen Roy.

Arctostaphylos alpina Spreng. Fersit Forest. Abundant on the top of Ben Chlinaig, together with *Loiseleuria procumbens* Desv., and on the moorland between this hill and Sgorr-na-Insse.

Trientalis europæa L. Wood near Roy Bridge, Glen Spean (W. A. S., 1891).

Samolus Valerandi L. Near Inverlair; a good many miles from the sea.

Scrophularia nodosa L. Glen Roy. Not recorded for W. Inverness in *Top. Bot.* ed. 2, so we mention it in case it has escaped observation.

Veronica alpina L. Glen Spean mountains, not very rare. Aonach Mor; Aonach Beg; Stob Coire-an-Easain More; Ben Socaich; Garbh Bheinn, &c. The var. *humifusa* of *V. serpyllifolia* was well marked in a cold, wet gully on Aonach Beg, at 3200 ft.

Euphrasia Rostkoviana Hayne, and *E. gracilis* Fr. are frequent about Glen Roy; *E. scottica* Wettst. (*E. paludosa* Townsend, non R. Br.) is also plentiful, and ascends to fully 2000 ft., preferring wet grassy or sedgy spots.

Rhinanthus Crista-galli L., var. *Drummond-Hayi* B. White. On several of the micaceous Glen Spean mountains; unusually luxuriant on the cliffs of Aonach Beg.

Melampyrum sylvaticum L. Thickets by the river, Glen Roy, and in a wood near Roy Bridge, Glen Spean.

Utricularia intermedia Hayne. Moorland between Roy Bridge and Aonach Mor.

Mentha hirsuta Huds. Glen Spean; evidently native. *M. rubra* Sm. grows by a ditch in Strath Fillan, between Tyndrum and Crianlarich, 88; doubtless an escape from a neighbouring farmhouse.

Littorella juncea Berg. In the stream called Amhainn Reidh, descending from the watershed of Glen Nevis to Lochtreighead.

Atriplex patula L. and *A. hastata* L. Shore of Loch Linnhe, near Fort William; *Suæda maritima* L. and *Salicornia herbacea* L. also occur here.

Polygonum lapathifolium L. A weed in the gardens of Roy Bridge Hotel.

Rumex Acetosa L. ascends to 3400 ft. in Glen Spean.

Salix Myrsinites L. The form *S. procumbens* Forbes was met with on Garbh Bheinn, Stob Coire-an-Easain More, and Aonach Beg, in small quantity. — *S. purpurea* L. By the Spean near Inverlair; locally plentiful, and looking thoroughly wild. A single small bush of *S. aurita* × *purpurea* was found here; it is a very good leaf-intermediate. — *S. alba* × *fragilis*. In Glen Spean, about a mile and a half below Roy Bridge; a shrubby bush, apparently not an intentional introduction, but very unlikely to be a native here.—*S. aurita* × *Caprea* and *S. aurita* × *cinerea* were gathered by the river between Tyndrum and Crianlarich, 88.

Malaxis paludosa Swartz. Boggy ground, Glen Roy. In this glen we also noticed *Habenaria conopsea* Benth., *H. albida* R. Br., and *H. chloroleuca* Ridley.

Sparganium ? affine Schnizl. Flowering, in a tarn about an acre in extent, on the divide between the Lairige-an-Leacan (Glen Spean) and the head of Glen Nevis, near the source of the Allt Coire-an-Radh, at fully 2800 ft. by aneroid. This is 600 ft. higher than any British record that we know of; but Rev. E. F. Linton informs us that he has gathered it at about the same level near the head of Canlochan Glen. The appearance of the plant was so peculiar that we thought it not unlikely to be one of the other Scandinavian species, but this may be due to the icy-cold water in which it grows. "Too young; either *Sp. affine* (sensu Neuman) or *Sp. speirocephalum* Neum." (Pastor L. M. Neuman, *ex* O. Nordstedt *in litt.*).

Scirpus setaceus L. Glen Roy; uncommon in the Highlands, according to our experience.

Eriophorum latifolium Hoppe. Moors on the south side of Glen Spean, not far from Lionachan.

Carex pauciflora Lightf. Frequent in similar situations to that of *Eriophorum latifolium*.—*C. curta* Good., var. *alpicola* (Wahlenb.). At 2700 ft. in a swamp on the east side of Ben-na-Van (? name); not seen elsewhere. — *C. vaginata* Tausch. Garbh Bheinn, at 2700 ft. *C. pulla* Good. is frequent in Glen Spean.

Agrostis scabra Willd. (*teste* Hackel). Alien. Apparently quite established on the West Highland Railway banks between Tulloch and Fersit siding, and between Corrour and Loch Treig; a very elegant grass. We were disposed to think American timber the most probable source of its introduction; a conjecture which is favoured by what Mr. Miller Christy ('Notes on the Botany of Manitoba') says of the plant (he adopts *A. laxiflora* Richards. as its name) in *Journ. Bot.* 1887, p. 298:—"It often grows in large patches, and generally it is the first species to spring up in old disused cart-trails. During August the heads break off at one of the joints of the stalk, and are driven about the prairie by the wind, doubtless to distribute the seed. After a high wind, it may sometimes be found clinging to fences and trees."

Poa Balfouri Parnell. Garbh Bheinn (no. 1649), at 2700 ft.—Var. *montana* Parnell. Aonach Beg (no. 1648), at about 3000 ft. Both were named by Prof. Hackel, who adds the following important note:—"1649 is, however, so near to what in our Alps we call *Poa nemoralis* var. *montana* Gaud., that I can find no marked difference. But, again, no. 1648 only differs from no. 1649 by the longer ligula, and by the uppermost node being placed lower down the stem; so that probably no clear line can be drawn between *P. Balfourii* and the alpine forms of *nemoralis*. We shall only be able to determine typical specimens with certainty, and shall often meet with specimens which must remain doubtful, or in which it will depend more upon the skill of the observer than upon real positive characters, how we are to designate them." *P. alpina* L. was only seen on Aonach Beg.

Asplenium viride Huds. Aonach Beg. Remarkably rare in this district, considering how largely the mountains consist of mica-schist.

ADDENDUM.—Since this paper was written, Dr. Focke has identified a bramble collected by the railway near Crianlarich Station, 88, as *R. Scheutzii* Lindeberg, "a form or subspecies of *R. rhamnifolius*." It differed widely in appearance from all British *rhamnifolius* that we have met with, when fresh. Cf. the remarks on this plant and *R. villicaulis* by Rev. W. Moyle Rogers, pp. 44–5.

DISTRIBUTION OF THREE SEDGES.

By C. B. CLARKE, F.R.S.

1. CYPERUS VEGETUS Willd. (*Sp. Pl.* i. 283) is abundant from Patagonia throughout Argentina and Chili, reaching north as far as Bolivia and Rio Janeiro. It also occurs (perhaps only introduced, in my opinion) both in California and Florida, but rarely. *C. virens* Mich. is common in North America, and is the *C. vegetus* of Pursh, as N. L. Britton has discovered. The Santee Canal in Florida and the coast of California are particularly rich in ballast plants from various parts of the world; I do not try to prove but that *C. vegetus* Willd. may be indigenous in Warm Temperate North America, though its home is certainly Warm Temperate South America.

C. vegetus Willd. is one of the few Chili plants that shows great capacity for colonizing remote lands. It is well established in the Azores. It has appeared in New Zealand under such circumstances that it has been described as a new indigenous species—being *C. gracilis* Buchanan or *C. Buchanani* T. Kirk. It was collected near Constantinople by Noe (n. 384), and in Sicily by Tineo. It is well established on the Atlantic coast of Europe from Coimbra up to Bordeaux. Finally, I have it collected as wild by Jenner near Seabrook, in Kent. It has maintained itself for a series of years in most places where it has once been introduced.

2. Pycreus tremulus C. B. Clarke (in Dur. & Schinz, *Consp. Fl. Afr.* v. 542) has been frequently collected and long known (since Poiret's time) in Madagascar, Mauritius, and Bourbon. I have lately received it from Mozambique, Uganda, and the Central Congo (Hens. n. 358). It is *Cyperus chlorostachys* Boeck.

C. Koch described in *Linnæa*, xxi. (1848), 623, two new Cyperi, viz. *Cyperus colchicus* C. Koch and *C. stachyophorus* C. Koch, from Mingrelia and Trebizond. These two species are one, *viz.* our *Pycreus tremulus.* I for some time imagined that this was a herbarium mixture; but the plant appears to be truly collected from the south of the Caspian to Colchis. *Pycreus tremulus* is a very "critical" species," it is true; but I think the Mascarene and Mingrelian plants are identical. It increases the difficulty with me that none of the allied species to *P. tremulus* inhabit Europe, West Asia, or North Africa; they inhabit America, Africa south of Tropic of Cancer, South-east Asia, and Australia. I think the true home of *P. tremulus* is certainly Mascarenia and Tropical Africa. If, then, it is an introduced plant in Mingrelia, the wonder is how it got introduced to such a place; and still more that it should have been able to establish itself there.

3. Mariscus congestus Vahl (*Enum.* ii. 350), sub *Cypero*, is abundant throughout the Cape Colonies, common in Temperate Australia. It appears to have been introduced into European botanic gardens at an early date; I have seen many garden examples. It is *Cyperus Paramatta* Martius (*Cat. Hort. Erlangen*, 24); it is *C. patulus* Hort. Monspel. (Spreng. *Syst.* i. 225, partly); it is *C. spectabilis* Link, *Hort. Berol.* i. 318; ii. 321; *Hort. Erfurt.* n. 346. (*Cyperus spectabilis* Boeck. is a totally different American species.) Like many botanic garden plants, it has been wrongly named, issued with wrong name, and redescribed under a new name; I have twenty synonyms for it. But, excluding the numerous garden specimens, or possible escapes, this species is frequently collected in remote localities. I have seen examples collected in Anatolia, Macedonia, Italy, and Lake of Geneva; and it is reported from Transcaucasia, Byzantium, Coimbra, and Potsdam. It is, I think, a species which is endowed with a capacity for colonization.

The books teem with unaccountable distributions: e.g. *Rhynchospora Brownii* Roem. & Sch., according to Boeckeler, inhabits Brazil, Orinoco, New Holland, and Nepal; while the closely-allied *Rhynchospora chinensis* Nees & Meyen, according to Boeckeler, inhabits China, Ceylon, and Sikkim up to 10,000 ft. elevation. But these two species (and many allied ones) are hardly separable from *Rhynchospora glauca* Vahl. If the whole are treated as one series, the distribution is "general"; and, if the series is subdivided on different characters from those relied upon by Boeckeler, the anomalies in the distribution disappear.

The three cases I call attention to are, I think, quite different; the near allies of *Cyperus vegetus*, for instance, are all American plants; no way of writing out or of redistributing into subspecies this American material would affect the remarkable establishment of *C. vegetus* Willd. in Europe and in New Zealand.

NOTE ON PLECTOCOMIA GRIFFITHII Becc.

By A. B. Rendle, M.A., F.L.S.

In rearranging the Palm-case in the public gallery of the Department of Botany at the British Museum, I found among the *Calameæ* a specimen of somewhat unusual interest. It had been previously exhibited as *Plectocomia elongata* Mart., sent by Griffith from Malacca, and was thus labelled in Griffith's handwriting. As it was obviously different from other specimens of *P. elongata*, it was necessary to investigate further. Reference to Griffith's *Palms of British East India* showed the plant to be the *P. elongata* of that work; and tab. ccxvii A might have been drawn from the British Museum specimen. A fruiting specimen had also been exhibited under the same label, and that is equally well represented by tab. ccxvii C. Our plant is therefore *Plectocomia Griffithii* Becc. in *Flor. Brit. India*, vi. 478, of which Sir Joseph Hooker says, in a note, that he has seen no specimen.

The only difficulty is in relation to tab. ccxvii B, which forms part of Griffith's *P. elongata*, and its relation to tab. ccxvii A Tab. ccxvii A is inscribed *Plectocomia elongata* (fœm.), and on the opposite page is this footnote:—"Dr. Martius' figures represent the spathes of the male and female alike; in the female specimens before me, though the flowers are open, the spathes are so closely imbricated and so concave that the branches are strictly subulate in form." This implies a difference between the form of the spathels ("spathes" of Griffith) in the two sexes, and tends to the conclusion that tab. ccxvii B represents a *male* plant (though this is not stated), a conclusion which is supported by the appearance of the flowers, which, although the spathels are spreading open, show no indication of styles. Our male specimens have, however, precisely the appearance of tab. ccxvii A; the branches of the inflorescence are narrowly cylindrical in form, and the spathels have their margins united to the top; and as the flowers seem quite mature, it is difficult to understand how the plate in question (ccxvii B) can refer to *P. Griffithii* Becc. Is it some other species—e. g. true *P. elongata* Mart.? If it belongs to *P. Griffithii*, we must suppose that it represents part of a female inflorescence, and in the footnote on p. 104 and on the plate ccxvii A must read *male* for *female*. Unfortunately we have no young female inflorescence at the Museum; a few flowers occur in the fruiting specimen, but the spathels are all widely spreading, as drawn in t. ccxvii C, and whether or no they were ever in the condition of tab. A it is impossible to conjecture.

A comparison of the following description, drawn up from our specimens, will prove their identity with the plant of Griffith's book:—

P. Griffithii Becc. MSS. apud Hook. fil. in *Fl. Brit. Ind.* vi. 478. *P. elongata* Griff. (non Mart.) in *Calc. Journ. Nat. Hist.* v. 96; *Palms Brit. East Ind.* 104, t. 217 A, B (?), C. Branch of male inflorescence 1 in. or more in diameter; bearing regularly arranged distichous spathes 4 in. long by $1\frac{1}{2}$ across. Spadices narrow, cylindrical, longest 18 in., diameter $\frac{2}{3}$ in. Spathels closely imbricated, distichous, margins connate, forming a tube widening gradually towards the mouth, where it is produced obliquely into a very broad obtuse apex, $1\frac{1}{2}$–$1\frac{3}{4}$ in. long, and about the same in circumference at the mouth. Flowers closely crowded in a dense panicle, shorter than the spathel, between the concave sides of which, the axis of the spadix, and the next higher spathel, they are so compressed as to become oblique in form. Generally 16 in number, the short branches bearing a pair of subsessile flowers. Bracts small, sharply acuminate. Rachis furfuraceous (scales dark chestnut-brown). Calyx dark-coloured; sepals forming a cup with a shortly ciliate margin and three shallow teeth; $1\frac{1}{3}$ line long. Petals lanceolate, less abruptly pointed than in *P. elongata* Mart.; 3–$3\frac{1}{2}$ by 1–$1\frac{1}{2}$ lines. Anthers 6, linear-oblong, $1\frac{1}{2}$ lines long, attached a little above the base to the filament, which is $1\frac{1}{4}$ lines long, and tapers rapidly above the middle. The flowers are rather rotten, and allow no rudiment of a pistil to be seen.

Female flowers very shortly stalked, arranged distichously (8 in number) on the spike, which is completely protected by the broadly ovate obtuse spathel, which measures $1\frac{3}{4}$ in. in length and breadth. Calyx similar to but larger than in the male ($\frac{1}{4}$ in. long); petals united below into a shallow cup, 1 line long, above which they narrow into a broadly-linear limb with a subacute tip, $3\frac{1}{2}$ by $1\frac{1}{3}$ lines. Filaments 6, triangular-subulate, bearing smaller anthers (apparently barren) than in the male. Styles 3, free to the base, 5 lines long.

Fruits still seated in the persistent perianth, 4 to 5 in each spathel which is now widely spreading. Globose, about 8 lines in diameter. Scales quadrate, polished, dark chestnut-brown in colour, with a lighter thin fimbriated edge; produced above into a long membranous tapering fimbriated tip. Seeds one or more.

P. Griffithii differs from *P. elongata* in the narrow cylindrical spadices and tubular spathels of the male inflorescence, and in its smaller fruits and the greater number which are borne in one spathel.

A fruiting spadix received from Mr. Ridley, and collected by him on Penang Hill, Pulau Penang, in Dec. 1895 (No. 7098), also belongs to this species.

ISLE OF MAN PLANTS.

By Arthur Bennett, F.L.S.

The list of Manx plants given by Mr. Hiern (*Journ. Bot.* 11–15) fills up a good many gaps in the common plants. It records forty-two species not in *Top. Bot.* ed. 2, and adds two varieties that I believe have not been reported in Great Britain before—*Polygala vulgaris* L. var. *minutiflora* Gren. & Godr., and *Ulex Gallii* Planch. var. *humilis* Planch. in *Ann. Sci. Nat.* 1849 (a translation of Planchon's excellent paper on *Ulex* will be found in the *Botanical Gazette*, 281–290, 1849).

There are still fifty-five species of common plants—*i. e.* those not having their counties noted in detail in *Top. Bot.*—unrecorded for the island. As so many visit the Isle of Man in the summer months, it may be of use to give the names of these: research is so much facilitated if one knows what to look for. The names are those of the 2nd ed. of *Top. Bot.*:—

Ranunculus sceleratus.
Arenaria trinervia.
Hypericum perforatum.
Genista anglica.
Trifolium medium.
Geum urbanum.
Epilobium hirsutum.
Peplis Portula.
Helosciadium inundatum.
Ægopodium Podagraria.
Pimpinella Saxifraga.
Æthusa Cynapium.
Torilis Anthriscus.
Anthriscus sylvestris.
Asperula odorata.
Leontodon autumnalis.
Hieracium boreale.
Carduus crispus.
Centaurea Cyanus.
Filago minima.
Veronica Anagallis.
V. hederifolia.
Mentha sativa.
M. arvensis.
Lamium album.
Lithospermum arvense.
Atriplex hastata.
Rumex nemorosus.
Mercurialis perennis.
Ulmus montana.
Salix alba.
S. fragilis.
S. viminalis.
Listera ovata.
Orchis mascula.
O. Conopsea.
Luzula multiflora.
Carex remota.
C. vulpina.
C. hirta.
Phalaris arundinacea.
Phleum pratense.
Alopecurus pratensis.
Agrostis canina.
Psamma arenaria.
Aira cæspitosa.
A. flexuosa.
Catabrosa aquatica.
Glyceria fluitans.
Poa trivialis.
Festuca sciuroides.
F. elatior.
F. pratensis.
Bromus giganteus.
B. asper.
Equisetum palustre.

It is impossible yet to say whether the flora of the Isle shows more affinity with the nearest Scotch, Irish, or English county until the lists are much more complete. That the majority or all of the fifty-five species named will be found seems most likely, as the species already on record show such an affinity with Watson's British type that the major portion of those wanting can hardly be absent.

In an interesting anonymous paper on the Isle of Man Flora in the *Phytologist*, iv. n. s., 161–169 (1860), dated from "Christ's Church Parsonage, Manghold, Isle of Man," the following species are given, but they were not accepted in *Top. Bot.*:—

Stellaria nemorum. Ballure Glen; Ballaglass Waterfall.

Geranium pusillum. Scarlett, near Castletown.

Trifolium fragiferum. Near the Dog Mills, Kirk Bride; Ballaugh, &c.

Lactuca muralis. Ballure Hill.

Carduus acanthoides. Fields and waste ground, but not common.

Orobanche major. "Near Ramsey," *Forbes.*

Lamium intermedium. Common.

Myosotis repens. Ditches on the Curraghs.

Atriplex littoralis. Sandy shores of the north.

Juncus maritimus. Scarlett. (In Mr. Hiern's list.)

Scirpus maritimus. The Lhen, Andreas. Mr. Holt also records this, and *S. setaceus.*

Polypodium Dryopteris. Mountains and glens, frequent.

Lastrea Thelypteris. Ballure Glen, &c.

In any future Flora of the Isle this paper must not be overlooked; it bears internal evidence of care, and there are very interesting remarks on the geology and climate of the Isle. There is also a general notice of its Flora by Prof. E. Forbes in the Rev. J. G. Cumming's *Isle of Man* (Van Voorst, 1848). See also *New Botanist's Guide*, p. 407; and Winch, *Contributions to the Flora of Cumberland.* A paper on the Mosses will be found in the *Phytologist*, ii. 20, 109 (1857), by J. H. Davies.

In *Journ. Bot.* 1874, 183, Dr. Trimen says, "Mr. J. F. Robinson, of Frodsham, Cheshire, is preparing a Flora." I do not know if any MSS. were found after his death in 1884, or whether anyone else took up the work.

A note on some "absentees" will be found in *Phytologist*, n. s. vi. 127 (1862).

[We believe that Mr. Robinson never proceeded with his projected Flora, and the inaccuracy of his statements as to Welsh plants prevents any feeling of regret that he did not carry out his proposal. The county records standing on his authority in *Top. Bot.* all need confirmation before they can be accepted as accurate.—Ed. Journ. Bot.]

WELWITSCH'S AFRICAN FRESHWATER ALGÆ.

By W. West, F.L.S., and G. S. West, A.R.C.S.

(Plates 365–369.)

(Continued from p. 42.)

XI.—Desmidiaceæ.

1. Gonatozygon De Bary (1856).

1. G. Ralfsii De Bary, *Conj.* 76–7, t. iv. f. 23–25 (1858). Long. cell. 217 μ; lat. 13·5 μ; lat. apic. 15 μ.

Pungo Andongo. Inter *Batrachospermum gracillimum*, ad lapides submersas in rivulo de Tangue; May 1857. No. 3.

2. Cylindrocystis Menegh. (1838).

1. C. crassa De Bary, *l. c.* 74, t. vii. C (1858). Long. 35 μ; lat. 25 μ.

Pungo Andongo. Ad latera boreal. et occid. de Pedra Songue; April, 1857. No. 12.

3. Penium Bréb. (1846).

1. P. oblongum De Bary, *l. c.* 73, t. vii. G, f. 1, 2 (1858). Long. 65–80 μ; lat. 22–24 μ.

Golungo Alto. Ad margines stagnorum rivi Cuango; Aug. 1857, No. 155.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Morro de Lopollo; Febr. 1860. No. 192.

2. Penium sp. Long. 28 μ; lat. 11·5 μ; this is probably *P. Mooreanum* Arch., but not seen in sufficient quantity for accurate identification.

Huilla. Inter *Utriculariam ecalcaratam*, Morro de Lopollo; April, 1860. No. 179.

3. Penium sp. Long. 26 μ; lat. 16 μ.

Huilla. Prope lacum Ivantala; March, 1860. No. 17.

4. P. curtum Bréb. in Kütz. *Species Algarum*, 167 (1849). *Closterium curtum* Bréb. (1840); Kütz. (1845). *Cosmarium curtum* Ralfs, *Brit. Desm.* 109, t. xxxii. f. 9 (1848). Long. 31–36 μ; lat. 18–19 μ.

Pungo Andongo. In pascuis spongiosis breve graminosis juxta rupes gigant. pr. Catete; May 1857. No. 111.

Huilla. Morro de Lopollo; Febr. 1860. No. 192.

5. P. adelochondrum Elfv. in *Acta Soc. Fauna et Flora Fenn.* v. 2, no. 2, 17, t. i. f. 13 (1881). All the examples have a faintly retuse apex; long. 38·5–42 μ; lat. 14–15 μ; lat. apic. 8·5–9·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15.

6. **P. variolatum**, sp. n. (tab. 368, fig. 23). P. parvum, diametro 4-plo longius, ad medium leviter constrictum, apices sub-

truncatos versus sensim et gradatim attenuatum, lateribus rectis; membrana tenuis et dense scrobiculata. Long. 34–37 μ; lat. 8·5–9 μ; lat. apic. 5·5 μ.

Huilla. Inter *Utriculariam ecalcaratam*, Morro de Lopollo; April 1860. No. 179.

7. P. MINUTUM (Ralfs) Cleve in *Öfv. K. Vet.-Akad. Förh.* 1863, Arg. 20, no. 10, 493 (1864). *Docidium minutum* Ralfs, *Brit. Desm.* 158, t. xxvi. f. 5 (1848). Cfr. *P. minutum* forma *genuina* West, in *Journ. Linn. Soc.* xxix. 129 (1892). Long. 126–138 μ; lat. bas. semicell. 15–18 μ; apic. 10–11 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15. In paludibus exsiccandis; April 1860. No. 176. Inter *Utriculariam ecalcaratam*, Morro de Lopollo; April 1860. No. 179. In graminosis paludosis juxta rivulum de Lopollo; April 1860. No. 180.

Forma MINOR Racib. in *Pamietnik Akad. Umiej. w Krakowie, Wydz. matem.-prz.* x. (60–1), (1885); West, *l.c.* Long. 69–85 μ; lat. bas. semicell. 5·5–9 μ; apic. 4·5–5·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15. In paludibus exsiccandis; April 1860. No. 176.

Var. GRACILE Wille in *Vid.-Selsk. Forhandl. Christiania*, No. 11, 51, t. ii. f. 33 (1880); West, *l.c.* Long. 110–123 μ; lat. bas. semicell. 7·5–9 μ, apic. 5·5–7 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Morro de Lopollo. No. 179.

Var. CRASSUM West, *l.c.* 130, t. xx. f. 1. Long. 98 μ; lat. bas. semicell. 17 μ, apic. 13 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15. Morro de Lopollo; May 1860. No. 182.

4. CLOSTERIUM Nitzsch (1817).

1. C. PUSILLUM Hantzsch in Rabenh. *Alg. Eur.* no. 1008 (1861); Rabenh. *Fl. Europ. Algar.* iii. 125 (1868).

Var. SUBRECTUM, var. n. (tab. 368, fig. 24). Var. cellulis paullo crassioribus quam in forma typica, diametro 4-plo longioribus, ventre recto, dorso leviter curvato, apicibus subtruncatis. Long. 46–49 μ; lat. 11–11·5 μ.

Pungo Andongo. Inter *Scytonema myochrous* v. *chorographicum* et *Dichotrichem gypsophilam* ad latera boreal. et occid. de Pedra Songue; April 1857. No. 12.

2. C. PERACEROSUM Gay, *Essai Monogr. Conj.* 75, t. ii. f. 18 (1883); *Bull. Soc. Bot. Fr.* xxxi. 339 (1884).

Var. ÆTHIOPICUM, var. n. (tab. 365, fig. 9). Var. cellulis apices subtruncatos versus plus attenuatis. Long. 200–205 μ; lat. 14–15 μ; lat. apic. 3 μ.

Pungo Andongo. In stagnis prope Aubilla (Condo); March 1857. No. 177.

3. C. ACEROSUM (Schrank) Ehrenb. *Abhandl. Akad. Wissenschaft.*

Berlin (1831), 68 (1832); Ralfs, *Brit. Desm.* 164, t. xxvii. f. 2. *Vibrio acerosus* Schrank.

Var. ANGOLENSE, var. n. Var. major, cellulis lateribus parallelis prope apices rotundatos attenuatis; membrana achroa glabraque. Long. 780 μ; lat. 38 μ.

Golungo Alto. Ad margines stagnorum rivi Cuango; Aug. 1857. No. 155,

4. C. TURGIDUM Ehrenb. *Infus.* 95, t. 6, f. 7 (1838); Ralfs, *l. c.* 165, t. xxvii. f. 3 (1848). A shorter form than the typical one; long. 504 μ; lat. 61 μ.

Mossamedes. In stagnis exsiccatis ad ripas flum. Bero; June 1859. No. 171.

5. C. LEIBLEINII Kütz. in *Linnæa*, viii. 596, t. xviii. f. 79 (1833); Ralfs, *l. c.* 167–8, t. xxviii. f. 4 (1848). Two forms:—

Loanda. In stagnis; Febr. 1858. No. 136. Lat. 38 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177. Lat. 22 μ.

6. C. REGULARE Bréb. in *Mém. Soc. Imp. Sciences, Cherbourg*, iv. 148–9, 304, t. ii. f. 35 (1856).

Forma MINOR. Lat. 18 μ; apicibus 173 μ inter se distantibus; striis (ut visis) 15.

Huilla. Cum *Nitella* sp. in stagnis pr. Catumba; April 1860. No. 189.

Some algologists appear to confuse this plant with *C. costatum* Corda; it is, however, very distinct from it.

5. DOCIDIUM Bréb. (1844).

1. **D. trigeminiferum,** sp. n. (tab. 368, figs. 32–34). D. mediocre, diametro 16–21-plo longius; semicellulæ elongatæ, levissime inflatæ ad basin, apices subtruncatos versus sensim attenuatæ, lateribus subrectis; granulis 6 circa inflationem levem ad basin semicellularum in paribus distinctis tribus ordinatis, base semicellulæ leviter angulari; membrana dense punctata. Long. 230–322 μ; lat. bas. semicell. 16–18 μ, med. semicell. 14–14·5 μ, apic. 9·5–10·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Etiam inter *Utriculariam ecalcaratam*, Morro de Lopollo; April 1860. No. 179.

This species is readily distinguished from *D. baculum* Bréb. by the much slighter basal inflation with no constriction above it, and by the different basal granules.

6. PLEUROTÆNIUM Näg. (1849).

1. **P. sparsipunctatum,** sp. n. (tab. 365, fig. 10). P. magnum, diametro circiter 22-plo longius; semicellulæ levissime attenuatæ, cum inflatione basali permagna, lateribus cum undulis minime profundis circiter 5 supra inflationem basalem, undulis gradatim minoribus apicem versus continuis; apicibus truncatis, tuberculis magnis rectangularibus 14 (visis 8) instructis; membrana delicate scrobiculata, scrobiculis 5–6·5 μ inter se distantibus. Long. 730 μ; lat. bas. inflat. semicell. 50 μ; lat. apic. 28 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

This species can be compared with *P. subcoronulatum* (W. B. Turn.) West, and *P. conjunctum* (W. B. Turn.).

2. P. Ehrenbergii (Bréb.) De Bary, *Conj.* 75 (1858). *Docidium Ehrenbergii* Bréb. (1844); Ralfs, *Brit. Desm.* 157, t. xxvi. f. 4 (1848). Long. 408 μ; lat. bas. semicell. 22 μ, apic. 16 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

3. P. maximum (Reinsch) Lund. in *Acta R. Soc. Scient. Ups.* ser. 3, viii. no. ii. 89 (1871). *Docidium maximum* Reinsch in *Abhandl. Senckenb. Naturforsch. Gesellsch.* vi. 140, t. xx. C ii. f. 1–2 (1866–7); in *Abhandl. Naturhist. Gesellsch. zu Nürnberg*, iii. 184, t. xii. f. 4 (1866). Long. 762–779 μ; lat. bas. semicell. 43–44 μ, med. semicell. 38·5–40 μ, apic. 25–27 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

The shorter semicells (which are sometimes only 175 μ in length) have only one basal inflation; the longer ones have two.

7. **Ichthyocercus,** gen. n.

Cellulæ cylindrico-fusiformes, subelongatæ, ad medium leviter constrictæ; a fronte visæ lateribus subparallelis, apicibus basibusque semicellularum in latitudine subæqualibus (nonnunquam apicibus paullo angustioribus vel paullo latioribus), depressione lata minime profunda ad apices per latitudinem totam, spina brevi leviter divergente ad angulum uuumquemque instructæ; a vertice visæ subcirculares.

1. **I. angolensis,** sp. unica. (tab. 368, figs. 26–31). I. subparvum, diametro 3–5-plo longior (sine spinis); semicellulæ a fronte visæ oblongæ, lateribus leviter convexis, infra apices leviter dilatatos interdum angustatæ; a latere visæ elongato-ovatæ, apice acute rotundato cum spina brevi instructo; membrana tenuissima delicate punctata vel punctato-scrobiculata; cet. charact. ut in genere. Zygosporæ globosæ vel late ellipticæ; membrana crassa, glabra, bilamellata, lamella interiori scrobiculata.

Long. (sine spin.)	46 ;	54 ;	55·5 ;	58 ;	61·5 ;	63·5 μ.
Lat. bas. semicell.	15 ;	17 ;	14·5 ;	19 ;	12·5 ;	16 μ.
Lat. apic. semicell.	12·5;	14 ;	12·5 ;	14 ;	13·5 ;	17 μ.
Lat. isthm. . .	13·5;	15·5;	12·5 ;	17 ;	11 ;	14·5 μ.
Long. spin. . .	1·6;	1·7;	2 ;	3 ;	1·9 ;	2·8 μ.

Diam. zygosp. 21–33·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15. In graminosis paludosis juxta rivulum de Lopollo; April 1860. No. 180. Morro de Lopollo; May 1860. No. 182.

This genus seems to be near *Tetmemorus* and *Euastrum*. It resembles the former in its elongate form, in being but slightly constricted in the middle, and in possessing a circular (or very nearly circular) vertical view; it differs from it, however, in the

absence of the deep linear notch at the apex, in the presence of a spine at each apical angle, and in the general conformation of the upper half of the semicells, which are somewhat wedge-shaped, with convex surfaces. From *Euastrum* it differs in its very slight constriction, its more parallel sides in front view, and in its circular vertical view.

The cell membrane appears to be much less firm than that of a *Tetmemorus*. The punctulations on it are in some specimens dense and in others distant from each other, and occasionally they are so well developed at the apical angles as to give them a faintly rough appearance. In one example the spine at one of the apical angles was duplicated, the two spines being placed close together, and of different lengths.

It also approaches the genus *Triploceros*, but the delicate character of the membrane, which is also destitute of warts, and the somewhat different apex distinguish it.

8. Tetmemorus Ralfs (1844).

1. T. granulatus (Bréb.) Ralfs in *Ann. Mag. Nat. Hist.* xiv. 257, t. viii. f. 2 (1844); *Brit. Desm.* 147, t. xxiv. f. 2, t. xxxiii. f. 1 (1848). *Closterium granulatum* Bréb. (1839). Long. 196 μ; lat. 34 μ; lat. isthm. 31 μ.

Huilla. Inter *Utriculariam ecalcaratam*, Morro de Lopollo; April 1860. No. 179.

2. T. lævis (Kütz.) Ralfs, *Brit. Desm.* 146, t. xxiv. f. 3 (1848). *Closterium læve* Kütz. *Phyc. Germ.* 132 (1845).

Var. continuus Nordst. *Alg. Sandvic.* 10 (1878). Long. 67 μ; lat. 25 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

3. **T. fissus**, sp. n. (tab. 368, fig. 25). T. parvus, diametro $2\frac{1}{3}$-plo longior, ad medium leviter constrictus; semicellulæ breviter oblongæ, lateribus convexis, apicibus incisura mediana profunda late aperta fissis, lateribus incisuræ convexis, angulis apicalibus obtuse acutis; membrana densissime et minutissime punctata. Long. 42 μ; lat. max. 18 μ; lat. isthm. 15 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This small species has somewhat unique characters that readily distinguish it from the other species of the genus.

9. Euastrum Ehrenb. (1832).

1. **E. acmon**, sp. n. (tab. 366, figs. 11, 12). E. submediocre, pæne $1\frac{2}{3}$-plo longius quam latius, profunde constrictum, sinu lineari in parte mediano, extremo ampliato, extrorsum aperto; semicellulæ trapeziformes lateribus multo concavis vel incudiformes, apicibus et basibus latitudine subæqualibus, apicibus late truncatis leviter retusis ad medium; a vertice visæ rhomboideo-ellipticæ polis subacutis; a latere visæ rectangulares angulis superioribus leviter rotundatis; membrana glabra. Long. 46 μ; lat. 28–31 μ; lat. apic. 23–27 μ; lat. constrict. sub apic. 15–17·5 μ; lat. isthm. 8–9 μ; crass. 18 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca

et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15.

The front view of this species is considerably different from that of *E. intermedium* Cleve, a depressed form of which it somewhat resembles at first sight, and the vertical and lateral views readily distinguish it from all *Euastra* of this class.

Var. CLAUSUM (tab. 366, fig. 13). Var. minor, sinu lineari extrorsum non aperto; membrana punctata. Long. 38·5 μ; lat. 25 μ; lat. apic. 22 μ; lat. constrict. sub apic. 13 μ; lat. isthm. 7·5 μ; crass. 15 μ.

Huilla. In graminosis paludosis juxta rivulum de Lopollo; April 1860. No. 180.

2. **E. holoscherum**, sp. n. (tab. 366, fig. 14). E. submediocre, duplo longius quam latius, profundissime constrictum, sinu angusto-lineari extremo ampliato; semicellulæ quadrato-ovatæ, angulis basalibus rectangulares, lateribus parallelis sed gradatim (vel potius subito) apicem versus angustatis, incisura profunda lineari mediana ad apicem; a latere visæ elongato-ovatæ lateribus retusis; membrana glabra. Long. 51 μ; lat. 25 μ; lat. isthm. 8 μ; crass. 15 μ.

Huilla. Inter *Microsporam abbreviatam* et *Batrachospermum huillense*, in rivulis prope Lopollo; May 1860. No. 187.

3. E. ANSATUM Ehrenb. *Abhandl. Akad. Wissenschaft. Berlin* (1831), 82 (1832); *Infus.* 162, t. xii. f. vi. 2 (1838); Ralfs, *Brit. Desm.* 85, t. xiv. f. 2. Long. 81 μ; lat. 36 μ, apic. 17 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

4. **E. huillense**, sp. n. (tab. 366, figs. 15, 16). E. submediocre, 2¼-plo longius quam latius, profunde constrictum, sinu angusto-lineari extremo subampliato; semicellulæ anguste truncato-pyramidatæ, angulis basalibus leviter rotundatis, lateribus subrectis vel leviter concavis elevatione mediana parva incrassata et leviter emarginata, angulis superioribus oblique subtruncatis et incrassatis, apicibus leviter convexis (nonnumquam subrectis) incisura profunde lineari in medio, ad basin juxta supra isthmum tumore prominenti; a vertice visæ oblongo-ellipticæ, tumore truncato-emarginato prominenti ad medium utrobique; a latere visæ oblongæ angulis basalibus rectangularibus et angulis apicalibus rotundatis; membrana dense et delicate punctata, cum scrobiculis paucis sparsis (circiter 6–9 in semicellula unaquaque) plerumque intra marginem unumquemque aggregatis et a latere visis distinctis. Long. 43–57 μ; lat. 20–26 μ; lat. apic. 13·5–16 μ; lat. isthm. 7·5–9·5 μ; crass. 18–19 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15. Etiam in paludibus exsiccandis; April 1860. No. 176.

E. ansatum Ehrenb. var. *turgidum* Bœrg. (in *Vidensk. Medd. Naturh. Foren. Kjöben.* (1890), 33, t. iii. f. 15) is somewhat near this species in outline, but its dimensions and other characters are very different.

5. E. SINUOSUM Lenorm. (1845); Ralfs, *l. c.* 85, t. xiii. f. 5 *a*, *b*, *c* (1848).

Var. REDUCTUM, var. n. Var. multe minor, sinibus minime profundis, lobis polaribus rotundioribus et non dilatatis ad apicem; tumoribus a vertice visis multe reductis; membrana punctata. Long. 46–50 μ; lat. 24–26 μ; lat. isthm. 8·5–9·5 μ; crass. 15 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15. Morro de Lopollo; May 1860. No. 182.

6. E. HYPOCHONDRUM Nordst. in *Acta Univers. Lund.* xvi. no. iv. 8, t. i. f. 11 (1880). A form with slightly different lateral lobes; this difference, however, may be owing to the specimens having been dried for a long period. Long. 46 μ; lat. 42 μ; lat. apic. 15 μ; lat. isthm. 11·5 μ; crass. 20 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

7. E. HYPOCHONDROIDES West & G. S. West in *Trans. Linn. Soc.* 2 Ser. v. 49, t. vi. f. 8 (1895). Long. 49 μ; lat. 38 μ; lat. apic. 13·5 μ; lat. isthm. 9 μ; crass. 17 μ.

Pungo Andongo. In stagnis prope Aubilla (Condo); March 1857. No. 177.

8. **E. subpersonatum**, sp. n. (tab. 366, fig. 19). E. submediocre, 1½-plo longius quam latius, profunde constrictum, sinu lineari extremo ampliato; semicellulæ subtrilobæ, constrictione levi ad basin lobi polaris; lobis lateralibus subrectangularibus, angulis basalibus dente minuto instructis, lateribus subretusis subdivergentibusque, angulis superioribus truncatis; lobo polari transverse rectangulari cum lateribus convexis, spina parva divergenti ad angulum superiorem unumquemque, incisura mediana profunda aperta ad apicem convexum; cum verruca magna rotundata in centro semicellularum: membrana delicate punctata. Long. 39 μ; lat. 27 μ; lat. apic. 19–21 μ; lat. isthm. 7·5 μ.

Pungo Andongo. In stagnis prope Aubilla (Condo); March 1857. No. 177.

This differs from *E. personatum* West & G. S. West (*l. c.* 52-3, t. vi. f. 19) in having one median wart nearer the middle of the semicells and no accompanying scrobiculations, in the lateral lobes being widest in their upper portion, and in the wide gaping apical notch.

9. E. ELEGANS (Bréb.) Kütz. *Phyc. Germ.* 135 (1845); Ralfs, *l. c.* 89, t. xiv. f. 7. *Heterocarpella elegans* Bréb. (1839). Long. 26–29 μ; lat. 16–19 μ; lat. isthm. 4–5·5 μ; crass. 11·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

Pungo Andongo. In stagnis prope Aubilla (Condo); March 1857. No. 177.

E. incurvatum W. B. Turn. (in *K. Sv. Vet.-Akad. Handl.* Bd. 25, No. 5, 83, t. xi. f. 1) and *E. annulatum* W. B. Turn. (*l. c.* 80, t. x. f. 36, 52) seem to us to belong to *E. elegans*. Turner's drawing of the "lateral view" of *E. annulatum* (t. x. f. 52) shows that it is somewhat oblique, and not strictly a lateral view. The zygospore of *E. incurvatum* is also that of some forms of *E. elegans*.

10. **E. subinerme,** sp. n. (tab. 366, fig. 18). E. parvum, circiter 1½-plo longius quam latius, profunde constrictum, sinu angusto-lineari; semicellulæ truncato-pyramidatæ, angulis basalibus rotundatis, lateribus excavationibus duabus projectione mediana rotundata, angulis apicalibus rotundatis, incisura mediana profunda lineari ad apicem rectum, tumoribus tribus trans basin semicellulæ uniuscujusque et tumoribus duobus alternantibus trans medium (ut in *E. sinuoso*); a vertice visæ anguste oblongo-ellipticæ, polis obtuse conicis, projectionibus rotundatis tribus et projectionibus duabus alternantibus supra utrobique instructæ, lobo polari oblongo-elliptico; membrana minute et sparsissime scrobiculata. Long. 35 μ; lat. 22 μ; lat. apic. 10·5 μ; lat. isthm. 8 μ; crass. 12 μ.

Pungo Andongo. In pascuis spongiosis breve graminosis juxta rupes gig. pr. Catete; May 1857. No. 111.

This species is in outline very similar to *E. inerme* (Ralfs) Lund. (*Nova Acta R. Soc. Scient. Ups.* ser. 3, viii. no. ii. (1871), 20, t. ii. f. 3), but it is much smaller and shorter, has different basal angles, and also a very different arrangement of surface tumors. From *E. sinuosum* Lenorm. it differs in its much smaller size and its short rectangular polar lobe as seen in front view; from the vertical view the polar lobe is oblong-elliptical, and not sinuate-quadrate.

11. E. EROSUM Lund. *l. c.* 22, t. ii. f. 6 (1871).

Forma MINOR. Long. 19–21 μ; lat. 13·5–15·5 μ; lat. isthm. 3·5–4 μ; crass. 10 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

12. E. COSMARIOIDES West & G. S. West in *Trans. Linn. Soc.* 2 Ser. v. 54, t. vi. f. 23 (1895).

Var. CURTUM, var. n. Var. cellulis brevioribus. Long. 23 μ; lat. 18 μ; lat. isthm. 5·5 μ; crass. 13·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

13. E. BINALE (Turp.) Ehrenb. in *Bericht. Verh. Preuss. Akad. Wissensch. Berlin*, 208–9 (1840); Ralfs, *Brit. Desm.* 90, t. xiv. f. 8 (1848). *Heterocarpella binalis* Turp. (1820), *Cosmarium Aitchisonii* as figured by W. B. Turner in *K. Sv. Vet. Akad. Handl.* Bd. xxv. no. 5 (1893), t. viii. f. 54 *a*, *b* (*a* is oblique); non *C. Aitchisonii* Schaarschm. (1884).

Var. ANGOLENSE var. n. (tab. 366, fig. 8). Var. minor, angulis apicalibus productis et late rotundatis, angulis basalibus rotundatis; cellulis a vertice visis subglobosis, polis productis; a latere visis semiellipticis. Long. 19 μ; lat. 10 μ; lat. isthm. 2·5 μ; crass. 8·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

14. E. DENTICULATUM (Kirchn.) Gay in *Bull. Soc. Bot. France*, xxxi. 335 (1884). *E. binale* v. *denticulatum* Kirchn. in Cohn, *Kryptog. Flora Schlesien*, 159 (1878). Long. 17–18 μ; lat. 13–13·5 μ; lat. isthm. 3·5–4 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

Forma. A form with the lateral lobes partly subdivided. Long. 26 μ; lat. 17 μ; lat. apic. 14·5 μ; lat. isthm. 5·5 μ; crass. 9·5 μ. (Cfr. W. & G. S. West in *Trans. Linn. Soc.* 2 Ser. v. t. ix. f. 16.)

Huilla. Inter *Gonatonema tropicum*, Morro de Lopollo; Febr. 1860. No. 186.

15. **E. tetragonum**, sp. n. (tab. 366, fig. 10). E. minutum, circiter $1\frac{1}{3}$-plo longius quam latius, profunde constrictum, sinu lineari; semicellulæ subrectangulares, apicem versus latiores, angulis basalibus leviter rotundatis, lateribus subretusis in medio, dente minuto ad angulum superiorem unumquemque, apice leviter convexo et retuso in medio, seriebus duabus granulorum parvorum trans angulum superiorem unumquemque, granulis 4 intra angulum basalem unumquemque, et papilla in centro; a vertice visæ ellipticæ, polis acutis dente parvo instructis, seriebus duabus transversis granulorum ad polum unumquemque, papilla mediana utrobique instructæ. Long. 18–19 μ; lat. bas. semicell. 13–13·5 μ; lat. apic. 14–15 μ; lat. isthm. 3·8–4·8 μ; crass. 9·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

Compare with *E. denticulatum* v. *rectangulare* West & G. S. West in *Trans. Linn. Soc.* 2nd ser. v. 53, t. vi. f. 21.

16. **E. bimorsum**, sp. n. (tab. 366, fig. 17). E. subparvum, $1\frac{3}{4}$-plo longius quam latius, profunde constrictum, sinu angusto extremo ampliato; semicellulæ pyramidato-trapeziformes, angulis basalibus rotundatis, lateribus rectis, incisuris parvis duabus et promontoriis æqualibus denticulatis tribus ad laterem unumquemque, dente parvo ad angulum superiorem unumquemque, incisura profunda lineari ad medium apicis recti undulato-denticulati, intra promontoria denticulis paucis, iis intra promontorium basalem insignibus, verruca magna in centro infra incisuram apicalem; a vertice visæ elliptico-oblongæ excavationibus latis duabus utrobique, projectione centrali truncato-emarginata, polis late rotundatis et undulato-denticulatis; a latere visæ pyramidato-oblongæ apice truncato denticulatoque, angulis basalibus denticulatis, projectione truncato-emarginata in medio lateris glabri uniuscujusque; membrana minute punctata. Long. 38 μ; lat. 23 μ; lat. apic. 18 μ; lat. isthm. 6 μ; crass. 17 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15.

This is very similar in outline to *E. Turnerii* West (in *Journ. Linn. Soc.* xxix. 141, t. xx. f. 18), but differs totally in both vertical and lateral views.

17. **E. subdivaricatum**, sp. n. (tab. 366, fig. 9). E. parvum, circiter $1\frac{1}{3}$-plo longius quam latius, profunde constrictum, sinu lineari et extrorsum leviter aperto; semicellulæ pyramidato-trapeziformes, sinibus duobus utrobique (eo infra apicem insigni), projectione mediana emarginata, angulis inferioribus superioribusque mucronatis, granulis parvis 4 in margine apicis subconvexi, de-

pressione mediana ad apicem et intra marginem verruca quadrigranulata utrobique, verruca trigranulata intra angulum basalem unumquemque, verruca majori triloba in centro; a vertice visæ rectangulari-oblongæ verruca lata emarginata in medio utrobique, angulis emarginatis, polis unidentatis. Long. 34·5 μ; lat. 27 μ; lat. apic. 18 μ; lat. isthm. 8 μ; crass. 15 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This approaches *E. divaricatum* Lund. (in *Nova Acta R. Soc. Scient. Ups.* ser. 3, viii. (1871) no. ii. 21, t. ii. f. 5), but differs from it in its broader apex with a very shallow notch, its trilobed median wart, in the two quadrigranulate warts within the apex, and in the trigranulate wart within each basal angle, which latter feature causes the vertical view to be rectangular-oblong.

10. MICRASTERIAS Ag. (1827).

1. M. ARCUATA Bail. in *Smithson. Contrib.* ii. Art. 8, 37, t. i. f. 6 (1851); Nordst. in *Ofvers. K. Vet.-Akad. Förh.* no. 3 (1877), 22–23, ii. 1–2. Long. 77 μ; lat. 90 μ; lat. isthm. 13 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

Var. SUBPINNATIFIDA, var. n. (tab. 366, fig. 7). Var. robustior quam forma typica; lobis lateralibus crassioribus præsertim ad basin, marginibus superioribus subrectis et horizontalibus, marginibus inferioribus subsigmoideis; processibus loborum polarum crassioribus et horizontalibus, apicibus leviter retusis in medio. Long. 59–62 μ; lat. (c. spin.) 65–68 μ; lat. isthm. 9·5–13·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Inter *Utriculariam ecalcaratam*, Morro de Lopollo; April 1860. No. 179.

This variety appears to connect *M. arcuata* with *M. pinnatifida*; its lobes are thicker and more horizontal than in typical examples of the former, and the basal ones much resemble those of the latter. The lobes, however, are not so thick and have not the same form as those of *M. pinnatifida*, the apex of the polar lobe is retuse in the middle, and the lobes all possess that small terminal sharp spine characteristic of all specimens of *M. arcuata*.

2. M. TROPICA Nordst. in *Vidensk. Medd. Naturh. Foren. Kjöben.* 1869, no. 14–15, 219, t. ii. f. 15 (1870). *M. expansa* var. γ. Wallich in *Ann. Mag. Nat. Hist.* ser. 3, v. 276–7, t. xiii. f. 9 (1860).

Forma. Apical processes almost horizontal; also with two large granules, one on each side of the extremity of each sinus. Long. 136 μ; lat. bas. 116 μ; lat. apic. 87 μ; lat. isthm. 20 μ (tab. 366, fig. 1).

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This form has the four larger granules (or papillæ) possessed by var. *guianense* Racib. (in *Flora* (1895), lxxxi. 34, t. iii. f. 15), but has not the teeth at their apex.

Var. ELEGANS, var. n. (tab. 366, fig. 2). Var. processibus tenuioribus gracilioribusque marginibus minutius denticulatis, denticulis numerosioribus intra margines; membrana delicate punctata. Long. 112 μ; lat. bas. 103 μ; lat. apic. 56 μ; lat. isthm. 17 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

Var. CRASSUM, var. n. (tab. 366, fig. 3). Var. robustior quam forma typica; processibus brevioribus et crassioribus, denticulis obtusis 4 ad apices processuum basalum. Long. 134 μ; lat. bas. 111 μ; lat. apic. 77-86 μ; lat. isthm. 20 μ.

Huilla. Inter *Utriculariam ecalcaratam*, Morro de Lopollo; April 1860. No. 179.

3. **M. robusta**, sp. n. (tab. 366, figs. 5, 6). M. mediocris, circiter 1½-plo longior quam latior, profunde constrictum, sinu aperto et semi-elliptico ad extremum acuminato; semicellulæ trilobæ; lobo polari magno, late expanso et extento utrobique ultra lobos laterales, subincudiformi cum collo brevi crasso et parte apicali subfusiformi, apice convexo serie dentium magnorum (circiter) 12 (maximis in medio) prædito, margine inferiori subrecto denticulis 2-3 utrobique prædito, truncato ad extremitatem unamquamque et cum denticulis 4; lobis lateralibus brevibus crassisque, arcuatis, margine superiori multe convexo denticulis acuminatis 3 instructo, margine inferiori concavo et glabro, extremitate truncata dentis parvis 3 instructa; semicellulæ serie granulorum (interdum geminatorum) intra marginem unumquemque colli lobi polaris, serie irregulari granulorum infra apicem et seriebus duabus irregularibus intra lobum lateralem unumquemque, in centro granulis sparsis 4-5 (nonnunquam majoribus); a vertice visæ parte basali late ellipticæ polis truncatis, parte apicali fusiforme-ellipticæ polis truncatis. Long. 88-106 μ; lat. bas. 57-63 μ; lat. apic. 64-69 μ; lat. isthm. 15-21 μ; crass. 29 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This beautiful and characteristic species has a very robust appearance on account of the shortness and thickness of the lobes; the subuncinate form of the lateral lobes is also peculiar.

4. M. POLONICA West & G. S. West in *Journ. Bot.* xxxiii. 66 (1895). *M. Kitchelii* Wolle, forma *polonica* B. Eichl. & Gutw. in *Rospr. Akadem. Umiejet. Krakow. Wydz. matem.-prz.* Ser. ii. tom. viii. vol. xxviii. 173, t. v. f. 41 (1895). Long. 46 μ; lat. 36·5 μ; lat. apic. 21 μ; lat. isthm. 11 μ (tab. 366, fig. 4).

Huilla. Lopollo; Febr. 1860. No. 192.

The African form has a higher polar lobe than the Polish one, and the infra-apical incision is a little more open. Eichler & Gutwinski's measurement given in the text, "long. cell. = 86 μ," is evidently a mistake, as their figure measures but 39 μ.

5. M. CRENATA Bréb. in Ralfs, *Brit. Desm.* 75, t. vii. f. 2 & t. x. f. 4 (1848). This plant is proportionately longer than *M. truncata* Bréb.; it has a more robust and deeper polar lobe, which is never retuse in the middle, though often flattened; it is also a very much rarer species. Long. 75-83 μ; lat. 54-58 μ; lat. isthm. 17-19 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15. Etiam inter *Gonatonema tropicum* et *Temnogametum heterosporum*, Morro de Lopollo; Feb. 1860. No. 172.

11. XANTHIDIUM Ehrenb, (1834).

1. X. FASCICULATUM Ehrenb. *Infus.* 147–8, t. x. f. 24*b* (1838); Ralfs, *Brit. Desm.* 114–5. Forma tumore mediano truncato-crenato spinam brevem gerens. Lat. sine spin. 42 μ; lat. cum. spin. 70 μ; crass. (c. spin.) 46 μ (tab. 368, fig. 16).

Huilla. In paludibus exsiccandis; April 1860. No. 176.

2. X. CRISTATUM Bréb. in Ralfs, *Brit. Desm.* 115, t. xix. f. 3 (1848).

Var. TROPICUM, var. n. (tab. 368, fig. 15). Var. sinu leviter aperto et acutangulo; semicellulis subsemicircularibus et leviter angularibus; spinis brevioribus, paribus apicalibus duabus quam in forma typica, spinis duabus ad angulos laterales, una supra alteram (superiori suberecta, inferiori horizontali), et cum spina una utrobique inter eas; membrana minute punctulata, scrobiculis centralibus nullis. Long. sine spin. 38–42 μ, cum spin. 50–52 μ; lat. sine spin. 33–36·5 μ, cum. spin. 38–44 μ; lat. isthm. 12·5 μ; crass. 19 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

In this variety there are two more spines on each semicell than in typical specimens of *X. cristatum*, and the semicells are of a somewhat different form; it may perhaps be another species.

3. **X. subtrilobum**, sp. n. (tab. 368, fig. 14). X. mediocre, paullo longius quam latius (sine spin.), profunde constrictum, sinu angusto-lineari; semicellulæ distincte trilobæ, lobis quadrangularibus; lobo polari latissimo, apice leviter concavo, angulo unoquoque spina valida erecta et leviter incurvata instructo; lobis lateralibus spina valida divergenti ad angulos superiores, angulis inferioribus leviter incrassatis, spina minori horizontali acuta (long. 7 μ) in medio marginis lateralis uniuscujusque; in centro cum annulo granulorum quadratorum 10 circum granulum majus centrali; a vertice visæ anguste oblongæ spina acuta ad polos rotundatos, spina utrobique ejus intra marginem, umbone magno granulato ad apicem in medio utrobique, lobo polari rectangulari cum spina valida ad angulum unumquemque; membrana punctata. Long. sine spin. 50 μ, cum. spin. 69 μ; lat. sine spin. 45 μ, cum spin. 60 μ; lat. isthm. 17 μ; crass. 26 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

It differs from *X. trilobum* Nordst. (in *Vidensk. Medd. Naturh. Foren.* 1869, no. 14–15, 230–1, t. iii. f. 35 (1870)) in being more distinctly trilobed with a rectangular sinus between the terminal and lateral lobes, in the lobes being more rectangular, in the presence of a spine in the middle of the outer margin of each lateral lobe, in the absence of crenulation at the inferior angles of the latter, in the rectangular polar lobe having but one spine at each angle (as seen in vertical view), and in the narrower vertical view with a more prominent central protuberance.

This species is closely allied to *X. calcarato-aculeatum* (*Holo-*

canthum calcarato-aculeatum Hieronymus in Engler, *Pflanzenwelt Ost-Afrika*, Theil C, 20 (1895)), described from the opposite side of the African continent at about the same latitude.

(To be continued.)

JOHN WHITEHEAD.

We have to deplore the loss of another of the working-men botanists who have contributed so much to the knowledge of our flora, mainly those of Lancashire and Cheshire—the two counties the manufacturing centres of which have been especially productive of this class of men. Perhaps we are wrong in supposing that the class is becoming extinct, for such men are usually content to work away quietly by themselves, or in company with a few congenial spirits of their own station of life, until some accident brings them into contact with more prominent workers in science. But in any case it is well to put on permanent record the trials and achievements of such men. Richard Buxton's autobiographical sketch prefixed to his *Botanical Guide* to Manchester plants is full of information regarding his contemporaries and himself; John Whitehead, who passed away at Oldham on May 6th, 1896, was a man of the same stamp, and some sketch of his career can hardly be uninteresting to the readers of this Journal.

John Whitehead was born in 1833 at Dukinfield, Cheshire, and lived there for the greater part of his life. He was employed in a cotton mill, and used to tell how, when Wilson came to see him about mosses, he was directed to the mill, where he found Whitehead in that state of "undress" which is usual in those warm regions. Mosses were his particular hobby, and his eye-knowledge of them was remarkable. We do not know at what period he took up the subject, but in 1862, writing to ask Wilson's help in naming a collection of mosses which had come from Australia as packing, he says he is "deeply engaged" in the study.

This was the year of the Lancashire cotton famine, and Whitehead and his fellow botanists were among the sufferers. The editors of the *Journal of Horticulture* suggested that something might be done by the sale of specimens, and the appeal which was issued on behalf of these men contains the following reference to Whitehead: "Whitehead has earned about four shillings per week for a long time, out of which, with some little savings, he had to keep his mother and two sisters. His stock is done, and now he has been compelled to apply for [parish] relief. He is, without exception, the best muscologist we have in this district, and a very steady man. He is prevented from following out his researches, although he has plenty of time on hand, through want of a little help. . . . . [He] told me he had been out last week collecting, and his shoes being done he got wet feet."* Whitehead's specimens were put on sale at a guinea per hundred, or three shillings per dozen.

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* *Journal of Horticulture*, Oct. 26, 1862, p. 585.

After a time Whitehead gave up cotton-spinning, and obtained employment with a Mr. Ashton, a master builder in Oldham, who, himself a botanist, helped and encouraged Whitehead in many ways, and took him on excursions to Wales and Scotland. Whitehead availed himself to the full of the opportunities afforded him by these and later excursions, and added much to our knowledge of British mosses; in 1875 he collected on Ben Nevis *Jungermannia neviceusis*, a species new to science. In 1887 he contributed Lancashire and Cheshire specimens to Dr. Braithwaite's *Sphagnaceæ Exsiccatæ:* it is from a photograph sent by Whitehead to Dr. Braithwaite about this period that our portrait is taken. His correspondence with English bryologists was somewhat extensive; and his letters in the Wilson correspondence show considerable critical knowledge. Mr. J. A. Wheldon writes: "My correspondence with Whitehead covers a period of about twelve years. I made his personal acquaintance about four years before his death. His activity as a field botanist had then given way to rheumatic troubles, the penalty of frequent inclement weather in his search after his beloved mosses. The first time I called upon him I found him residing in Oldham in a small house such as usually occupied by respectable artizans. He was not well enough to go out, but he welcomed me as an old correspondent very cordially. With the usual hearty hospitality of Lancashire folk, he urged me to stay for tea, which I drank with his wife and him. On the table was a saucer containing several mosses floated out, which he informed me he had been showing to some of the members of the local Botanical Society,

and explaining how to detach and examine the leaves. Although not in a position to spend much money on his hobby, he had collected personally many of our rarest British plants."

A letter from Prof. Barker, formerly of the Owens College, who purchased Whitehead's herbarium, gives further particulars as to Whitehead's personality:—"Whitehead worked hard all the week, and took long walks on Saturday afternoons and Sundays in quest of plants. With no help for many years beyond a pocket-lens, he gained an eye-knowledge of the species of mosses which was to me wonderful, and when at last he got a compound microscope, he was delighted with the new world of cell-structure, &c., opened up to him. It was a firm article of his faith that every one should have the credit for any discovery which was his due, and when he found any other person transgressing in this respect, he would not hesitate to express his opinion forcibly and freely. The late Dr. Wood, of Manchester, who seemed to have been the local authority on mosses in Whitehead's early collecting days, used to come in for severe censure for giving Schimper inaccurate or wrong information, and claiming credit for himself which belonged to others. Dr. Wood, I imagine, had patronizing airs which a man of Mr. Whitehead's sturdy independence would be sure to resent. On one occasion Dr. Wood explained to a few of them that they were his jackals! and Mr. Whitehead said he claimed the lion's share of the prey too. With probably little schooling to start with, he evidently educated himself. He could of course speak the dialect of his fellow workmen, but he could also speak and write good English with scarcely a trace of dialect. I think he could even understand pretty well the description of a moss in Schimper's *Synopsis*, though of course he had never learned Latin. He was an excellent example of the educational value of scientific pursuits. His conduct was in all respects that of a man of culture. He also took a keen interest in workmen's questions, and on opening a newspaper usually looked first at the cricket or football column. His enforced leisure was occupied almost altogether in working at mosses, and when he died we felt that we had lost the chief authority on that subject in this district. The words on his funeral card seem to me most appropriate—'One of Nature's nobles, a lover of the meadows, woods, mountains, and dells, and of the verdant mosses that grow around us.'"

When, a few years back, Whitehead was incapacitated for work by an attack of rheumatism in one of his knees, a subscription was raised in his behalf among leading men of science, to which the Royal Society contributed £25. This subscription was mainly organized by the Oldham Microscopical Society and Field Club, to which, in 1894, Whitehead presented a valuable moss-herbarium. For many years he was the elected president of the Ashton Linnean Botanical Society, and about this time he was appointed first president of the Manchester Cryptogamic Society, of which he was later elected an honorary member. It is to be regretted that the Linnean Society does not more frequently confer its Associateship upon men of this class; a glance at the present list will show the names of several who from their position might be expected to become Fellows, thus making way for those for whom the honour of Associate was originally intended.

Although Whitehead's attention was chiefly directed to mosses, it was not confined to them. It will be remembered that he was one of the party which discovered *Carex ornithopoda* in Miller's Dale, Derbyshire, thus adding that plant to the British flora; the specimens from which the figure and description in this Journal for 1875 (t. 164) were taken were furnished by him. He also added *Chara Braunii* to our flora in August, 1883 (see *Journ. Bot.* 1883, 249). At this time he was working, with other local botanists, at a Flora of Ashton-under-Lyne and district, which was published in 1888. His principal publications in connection with his special subject were, two lists of mosses—one of those of Ashton-under-Lyne (*Naturalist*, 1886, pp. 85–100), the other of the Mosses of North Derbyshire, in this Journal for 1894, pp. 193–201; the latter was locally printed with a few additions and corrections.

James Britten.

FERTILIZATION OF SPRING FLOWERS ON THE YORKSHIRE COAST.

By I. H. Burkill, M.A., F.L.S.

The observations contained in this paper only extend over two years. It had been the writer's intention that for a space of ten years, if possible, observations should be made in each successive spring; but this had become impossible. As these first two seasons proved so very different in climatic conditions, the notes made are not without interest. Those for 1895 furnished the material for a table published in the *Annals of Botany*.*

No flowers are so at the mercy of climatic conditions as are those of early spring. They are the pioneers of the season, and, as pioneers, meet with difficulties which do not endanger those of June and July; yet they avoid by their early flowering the severest of the competition for insect visitors, and some apparently profit by it. Müller remarks: "*Stellaria media* has the greatest chance of cross-fertilization in early spring, for before that time no insects are on the wing (in S. Germany), and afterwards many more attractive flowers compete with it."† And his observations confirm the statement.

Winter is a wedge driven, in our hemisphere, into the seasons from the north; in warm regions a slight barrier, in arctic regions an impassable barrier. With us autumn and spring may exchange floras to some extent. Instances of autumn-flowering of *Corylus Avellana*, *Mercurialis perennis*, and others, are familiar to us, and, on the other hand, in warm open winters the unprotected flower-buds of late plants may live through the cold months, and come into blossom in the spring.*

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* Vol. ix. p. 273 (1895).

† *Fertilization of Flowers*, p. 136; London, 1883.

Two origins then are conceivable for the vernal flora,† as also two for the autumnal. We may suppose the summer, by the earlier development of some flowers, yielding up—crowding out—some of its abundant blossoms to the spring months, and we may suppose some belated autumnal emigrating to the spring flora. The evidence for the first hypothesis is conclusive, that for the second insufficient. In any case the work most necessary at present is the estimating of the advantage to be gained by such a migration.

The cost to most plants is not inconsiderable; to make the order of the production of the important organs—flower, fruit, leaves, or even flower, leaves, fruit, instead of leaves, flower, fruit, is to make an alteration of no small moment, in so much as the leaves are the workshops whence the food-supply is drawn, and there must needs be a store laid by before the drain comes upon the production of pollen, honey, scent, the bright parts of the flower, and, greatest of all, the feeding of the growing seed. To risk severe weather may not merely mean to risk the destruction by frost of tender growing seeds, so often the case in our fruit trees, or to risk the scarcity of insect visits, but, if the suggestion made later in the case of *Capsella* be correct, it means sometimes the destruction of stamens, so that fertilization becomes an impossibility. These are the considerations which we must put into the scales and attempt to balance against one another; and these are the ideas which suggested the observations here recorded. To answer the problem is impossible. I shall merely be able to add a little which will ultimately help towards its solution.

THE INSECT-VISITORS.

There is never throughout the whole cycle of the year a season absolutely insectless, and the flowers which may be seen flowering about Christmas get occasional visitors.‡ Yet in the winter months flower-visiting insects are so scarce that these visits are extremely few. With the warm days at the beginning of March hybernating insects come out—the hive-bees to begin collecting honey and pollen, fertilized female humble-bees to nest and make their store of food for their grubs; the mid-tongued bees, Andrena, etc., appear in abundance; certain early Syrphidæ, such as Melanostoma quadrimaculatum, appear on the wing, and others which have hybernated reappear; a few beetles may be seen; but more important still are the short-tongued flies of the genera Lucilia, Calliphora, Scatophaga, Sepsis, and

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* Instances of this came to my notice during the course of these observations; *Erica Tetralix* flowered near Scarborough, on the moors, on March 8th, and *Scabiosa arvensis* on the cliffs on March 13th, 1896. The stamens of the latter were infertile (contabescent).

† Cf. Foerste, "On the relations of certain fall to spring blossoming plants," *Bot. Gazette*, xvii. (1892), p. 1.

‡ I have records of visits for January 2nd, 1896, of Apion ulicis Forst. (C) and Thrips to *Ulex europæus*, and of Coelopa sp. (D) and Thrips to *Bellis perennis*.

Helomyza. The circle widens as the days get warmer; the humblebees become more numerous; a few hybernated butterflies appear, the earliest usually being Vanessa urticæ; ants and wasps appear; a long-tongued fly, Volucella, appears, and, in addition, other flies, as Pollenia rudis, Phorbia, Siphona geniculata, and Dilophus albipennis. These are the insects upon which the flowers have to depend for their cross-fertilization, and this approximately the order of their appearance. In Table I. I have tabulated my observations for periods of seven or eight days, as convenient. The first five columns give figures of all the insects (individuals) seen visiting flowers in 1895, and the second five give the same for 1896. The absolute numbers are, of course, much affected by the state of the weather, the proportions to a less degree, for the habits of various insects vary considerably: some, such as the butterflies, usually fold their wings when a cloud-shadow passes over them; while others, like Thrips, are almost always to be found in flowers which afford them shelter.

Observers hitherto have neglected to study the frequency of insect-visitors, upon which the amount of cross-fertilization depends, confining themselves to the mere consideration of the variety of visitors attracted. To the entomologist such facts are sufficient, but to the botanist the number of individuals is of quite as great importance.

TABLE I.—NUMBER OF FLOWER-VISITING INSECTS.

		1895.					1896.				
		A.	B.	C.	D.		c.	d.	e.	f.	
		March 15–22.	March 23–29.	Mch. 30–April 5.	April 6–11.	TOTAL, 1895.	March 23–29.	Mch. 30–April 5.	April 6–11.	April 12–19.	TOTAL, 1896.
HYMENOPTERA.	Apis........	3	—	—	8	*11*	10	—	3	81	*94*
	Bombus	—	—	—	5	*5*	5	—	14	54	*73*
	Andrena, &c.	35	12	20	27	*94*	2	1	3	9	*15*
	Vespa	—	—	—	—	*0*	—	—	—	1	*1*
	Ants	—	2	2	3	*7*	—	—	—	—	*0*
	Ichneumons .	8	—	30	13	*51*	1	5	2	1	*9*
	Lepidoptera .	—	—	7	—	*7*	1	—	—	12	*13*
DIPTERA.	Syrphidæ ..	27	26	15	30	*98*	39	4	7	23	*73*
	Empidæ	—	—	—	—	*0*	—	—	—	2	*2*
	Muscidæ	262	21	38	110	*431*	21	11	6	53	*91*
	Scatophagidæ	27	14	15	319	*375*	147	101	83	260	*591*
	Other Flies..	83	54	201	194	*532*	55	37	14	46	*152*
	Coleoptera ..	3	2	3	18	*26*	2	3	15	23	*43*
	Hemiptera ..	—	—	2	2	*4*	—	—	—	1	*1*
	Thysanoptera	32	41	74	51	*198*	—	—	252	81	*333*
	Etc.........	26	2	3	7	*38*	—	—	—	—	*0*
		506	174	410	787	*1877*	283	162	399	647	*1491*

A short review of the efficiency of these insects in flower-fertilization may not be out of place.

Throughout this paper I shall arrange the groups and the species within the groups in a sequence which is more or less in accordance with their efficiency. Firstly, in the Hymenoptera:—the humble-bees, with their regular habits and long tongues (Bombus hortorum, ☿ 14–16, ♀ 19–21 mm.; B. agrorum, ☿ 12–13, ♀ 13–15; B. lapidarius, ☿ 10–12, ♀ 12–14; and B. terrestris, ☿ 8–9, ♀ 9–11), and also the hive-bee (Apis mellifica, ☿ 6 mm.), are the best of flower-fertilizers; next come the diligent Andrenidæ with tongues of mid-length, and less efficient, because they visit only to feed themselves, and not to feed their young, the cuckoo-bees, *e. g.* Nomada; the short-tongued wasp, in spite of its diligence, is of considerably less use to plants; and the lounging Ichneumons* and creeping ants of scarcely any use. The second group of insects, the Lepidoptera—often extremely long-tongued, but inconstant in their attentions—are of considerable service to plants, though scarcely to the spring flora. Proceeding to the flies, we have among them the hover-flies or Syrphidæ, which in length of tongue and suitability for flower-fertilization rank next to the Andrenidæ; the Empidæ, which follow them, scarcely affect the early spring flora; not far behind come the busy gadding Muscidæ, among which the blue-bottles (Calliphora) and little green Lucilia are particularly noticeable. The remainder of the spring flies are of lower specialization as far as a floral diet is concerned. Of other insects, Hemiptera live on the juices of plants which they probe, and at times probe the nectaries in the flowers; some Coleoptera are regular flower-visitors, but all are very simply organized in their mouth parts. Thysanoptera are flower-loungers, just like the Ichneumons mentioned above, and are more likely to effect self- than cross-fertilization. Lastly, a few Collembola visit flowers, apparently for the sake of the honey, and certain crab-spiders, not for any part of the flower, but because of the flies which they are able to catch. I have several times witnessed a struggle take place on the capitulum of a coltsfoot between Xysticus and a Lucilia which had fallen into the open claws of the spider. *Erythrina* is fertilized not by the flies which visit it, but by the sun-birds which come to feed on the flies; so, too, *Tussilago* may now and then be fertilized through the agency of this spider. For this reason—they are more efficient than Thrips—I prefer to include them as flower-visitors.

Two things are necessary to the flower: firstly, efficiency in the habits of the visitors, and, secondly, efficiency in their numbers. The most desirable species of visitors are those which best combine these two desiderata. In point of habit, Apis, Bombus, Andrena, Lepidoptera, Syrphidæ, Empidæ, and perhaps Muscidæ are desirable; in point of numbers, Table I. shows that the Empidæ and Lepidoptera must be excluded, and to some extent also Apis and Bombus.

ABBREVIATIONS.—**Hl.**, **Hm.**, **Hs.** = long-, mid-, and short-tongued Hymenoptera; **L.** = Lepidoptera; **Dm.** and **Ds.** = mid-

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* Throughout this paper I shall use the word Ichneumon to denote any of the Terebrantia, and not the one genus of that name.

and short-tongued Diptera; **C.** = Coleoptera; **Hem.** = Hemiptera; **T.** = Thysanoptera. sh. = sucking honey; fp. = feeding on pollen; cp. = collecting pollen as bees do for their young; seeking h. = seeking honey, but not obtaining it. '94, '95, '96 give the years in which the observations were made. Square brackets [ ] are used to enclose the names of species which came under observation, but do not truly belong to the early spring flora.

DISTRIBUTION OF INSECT-VISITORS.

All the plants observed in bloom during the periods of observation will be mentioned here under their biological classes; those whose names are printed in small capitals (without an asterisk) are flowers which—using a term foresters employ in the same sense——may be called "dominant" or "ruling" species; those in small capitals preceded by an asterisk may be considered as "subdominant" or "conditionally ruling"; while species whose names are printed in italics are "dependent." The keenest competition is between species of the same class, and the dependent *Draba verna* competes with the subdominant *Cochlearia officinalis* and the dominant *Ranunculus Ficaria.* In a case like this, supposing other things (*e.g.* amount and accessibility of honey, attractiveness in scent and colour, &c.) equal, the common species is a large host scarcely harassed by the single regiment on its flank; while the scarce species is this single regiment, in constant danger of total annihilation should the struggle become acute.

Class I. (W.) Wind-fertilized flowers.

*MERCURIALIS PERENNIS L.—No visitors.

*ULMUS CAMPESTRIS Sm.—No visitors.

CORYLUS AVELLANA L.—**Dm.**: Melanostoma quadrimaculatum Verrall, ♂ and ♀, fp., '95.

ALNUS GLUTINOSA L.—No visitors.

Populus nigra L.—**Ds.**: Calliphora cognata Mg., seeking h. on ♂ flowers, once, '96.

Empetrum nigrum L.—No visitors.

POA ANNUA L.—No visitors.

[*Plantago lanceolata* L. *Luzula campestris* DC.—No visitors.]

Class II. (Po.) Flowers offering pollen only to their guests.

*ANEMONE NEMOROSA L.—**Hl.**: Bombus terrestris L., '94, '96. **Dm.**: Melanostoma quadrimaculatum Verrall, fp., '95. **Ds.**: Scatophaga stercoraria L., fp. and seeking h., '95, '96; Anthomyia sp., fp., '95, '96. **Hem.**: Anthocoris sp., seeking h., '96. **T.**: Thrips sp., ? seeking h., '96.

Alchemilla arvensis Lam.—No visitors.

Class III. (A.) Flowers with freely-exposed honey.

*CHRYSOSPLENIUM OPPOSITIFOLIUM L.—**Hs.**: a small ichneumon, '95. **Dm.**: Melanostoma quadrimaculatum Verrall, '95. **Ds.**: Sepsis nigripes Mg., '95; Chironomus ? 2 sp., '95; Sciara sp., '95;

Lonchoptera sp., '95; Exechia sp., '95. **T.**: Thrips sp., '95. **Collembola**: Lepidocyrtus sp., '95, '96. All the above at honey. **Araneida**: 1 sp., lying in wait.

Chrysosplenium alternifolium L.—**Ds.**: Cecidomyia sp.? and 3 other small flies, '95. **C.**: Tachyporus chrysomelinus L., '95; Lathrimæum atrocephalum Gyll., '95. **Hem.**: 1 sp., '95. All sh.

*Adoxa Moschatellina L.—**Hs.**: Pezomachus sp., '95; another small ichneumon, '95. **Dm.**: Melanostoma quadrimaculatum Verrall, '95. **Ds.**: Scatophaga stercoraria L., '95; Sepsis nigripes Mg., '95; Sciara sp., '95, '96; Exechia sp., '95; Rhyphus sp., '95; and 3 other species, '95, '96. **C.**: Apion fagi K., '95. **T.**: Thrips sp., '95. All at honey.

*Salix Caprea L. (including S. cinerea L.)—To ♂ catkins:—**Hl.**: Apis mellifica L., '96; Bombus terrestris L., sh. and cp., '96, frequent. **Hm.**: Andrena gwynana K., cp., '96. **L.**: Vanessa urticæ L., sh., '96. **Dm.**: Eristalis pertinax Scop., sh., '96; Melanostoma quadrimaculatum Verrall, '96. **Ds.**: Lucilia cornicina F., '96; Pollenia rudis F., '96; Scatophaga stercoraria L., '96. To ♀ catkins:—**Hl.**: Apis mellifica L., '95; Bombus hortorum L., '95; B. terrestris L., '96. **Hm.**: Andrena clarkella K., ♂, '95. **Dm.**: Eristalis pertinax Scop., '96; Melanostoma quadrimaculatum Verrall, '95; Empis sp., '96. **Ds.**: Calliphora erythrocephala Mg., '95; Pollenia rudis F., '95.; Sepsis nigripes Mg., '95; another small fly, '96. All at honey. **Acarina**: a small acarid running upon the catkins, '95. To catkins bearing both ♂ and ♀ flowers with transitions:—**Hl.**: Bombus hortorum L., '95. **Hm.**: Andrena gwynana K., ♀, '95. **Hs.**: ichneumon, 1 sp., '95. **L.**: Vanessa urticæ L., '95. **Dm.**: Melanostoma quadrimaculatum Verrall, '95. **Ds.**: Lucilia cornicina F., '95; Lasiops sp.?, '95; Phorbia muscaria Mg., '95; Phorbia sp., '95; Actora æstuum Mg., '95; Scatopse notata L., '95. All at honey.

*Salix aurita L.—Only observed in '96. To ♂ catkins:—**Hl.**: Apis mellifica L., sh., very abundant; Bombus terrestris L., sh.; B. agrorum F., sh. **Hm.**: Andrena gwynana K., sh. and cp.; A. clarkella K. **Dm.**: Eristalis arbustorum L. **Ds.**: Scatophaga stercoraria L., sh.; Lasiops sp., fp. To ♀ catkins:—**Hl.**: Apis mellifica L., sh.; Bombus terrestris L., ♀ sh. **Dm.**: Melanostoma quadrimaculatum Verrall, sh. **Ds.**: Scatophaga stercoraria L., sh.; Lasiops sp.

Salix viminalis L.—To ♀ catkins:—**Hm.**: Andrena clarkella K., ♂, '95. **Hs.**: an ichneumon, '96. **Dm.**: Syrphus lasiophthalmus Ztt., '95; Melanostoma quadrimaculatum Verrall, '95. **Ds.**: Calliphora cognata Mg., '95. Scatophaga stercoraria L., '95, '96; Helomyza sp., '95; Lasiops sp., '95; Tephrochlamys rufiventris Mg., '95; Hylemyia sp., '95; Rhyphus fenestralis Scop., '95; Actora æstuum Mg., '95; Simulium sp., '95; another species, '95, '96. **Hem.**: 1 sp., '95. All the above, except Simulium, at honey.

*Salix purpurea L.—To ♂ catkins:—**Hm.**: Andrena gwynana K., ♀, '95, '96. **Dm.**: Eristalis pertinax Scop., '96; Melanostoma quadrimaculatum Verrall, '95. **Ds.**: Scatophaga stercoraria L., sh., '95, '96; Limnophora septemnotata Ztt., '95; Phorbia sp., '96; Actora æstuum Mg., '95; Sepsis nigripes Mg., '96; Hylemyia sp., '95; Scaptomyza graminum Fln.?, '96; and 3 other small flies, '96. **C.**: Tachyporus hypnorum F., '96. To ♀ catkins:—**Ds.**: Muscid., 1 sp., '96; Scatophaga stercoraria L.. '96.

[*Anthriscus sylvestris* Hoffm. — **Ds.**: Sepsis nigripes Mg., sh., '96. *Heracleum Sphondylium* L. and *Galium Cruciata* Scop. No visitors.]

Class IV. (AB.) Flowers with half-hidden honey.

Ranunculus Ficaria L.—**Hl.**: Apis mellifica L., cp. and sh., once, '95; Bombus agrorum F., sh., once, '96. **Hm.**: Andrena gwynana K., ♂ and ♀, sh., occasional, '95, '96; A. clarkella K., sh., '96; A. nigroænea K., ♀, '95. **Hs.**: Formica fusca L., '95; an ichneumon, sh., '95. **L.**: Vanessa urticæ L., sh., '95, '96. **Dm.**: Eristalis pertinax Scop., sh. and fp., frequent, '95, '96; E. arbustorum, sh., once, '96; Chilosia nebulosa Verrall, '95, '96; Syrphus lasiophthalmus Ztt., sh., '95; Melanostoma quadrimaculatum Verrall, ♂ and ♀, sh., '95; Empis sp., sh., once, '96. **Ds.**: Calliphora cognata Mg., sh., once, '96; Lucilia cornicina F., sh. and fp., '95, '96; Pollenia rudis F., once, '95; Scatophaga stercoraria L., sh. and fp., '95, and abundantly visiting in '96; Phora sp.?, '96; Sepsis nigripes Mg., fp. and sh., occasional, '95, '96. **C.**: Meligethes picipes Sturm, sh., abundant, '96; Coninomus nodifer Westw., '95; Thyamis fuscicollis Foudr., '95. **T.**: Thrips sp., '96.

*Caltha palustris L.—**Hl.**: Apis mellifica L., cp., once, '96. **Dm.**: Syrphus sp., fp., once, '96. **Ds.**: Scatophaga stercoraria L., sh. with difficulty, '96. **C.**: Meligethes picipes Sturm, sh., once, '96. **Hem.**: Deræocoris sp.?, puncturing base of the flower, '95.

Cardamine hirsuta L.—No visitors seen.

Erophila vulgaris DC.—**Ds.**: one tiny fly seen twice sh., '94. No visitors seen in '95, '96.

*Cochlearia officinalis L. — **Hs.**: one sp. of ichneumon sh., '95, '96. **Ds.**: Scatophaga stercoraria L., sh. and fp., '95, '96; Hylemyia sp.?, sh., '95; Coelopa sp., sh., '96; Scaptomyza graminum Fln., sh., '95; Sepsis nigripes Mg., sh., '95, '96; and another fly, '95, '96. **C.**: Meligethes picipes Sturm, sh., '96.

Sisymbrium Thaliana Hook.—No visitors seen.

Capsella Bursa-pastoris Moench.—No visitors seen, though constantly under observation.

Stellaria media Cyr.—**Hs.**: Pezomachus sp., '95. **Ds.**: Lucilia cornicina F., '95; Scatophaga stercoraria L., '95, '96; Phorbia muscaria Mg., '95; Phora sp., '95; Sepsis nigripes Mg., '95; Scatopse notata L., '95. **T.**: Thrips sp. All sh.

Cerastium triviale Link.—**Ds.**: Helomyza sp., '95; Phora sp., sh., '96. **T.**: Thrips sp., sh., '96.

*Potentilla Fragariastrum Ehrh.—**Hm.**: Andrena gwynana K., ♂ sh., ♀ cp., '95, '96; A. clarkella K., ♂ and ♀, '95. **Hs.**: Formica fusca L., sh., '95; 3 small sp. of ichneumon sh., '95. **Ds.**: Siphona geniculata Deg., sh., '96; Calliphora cognata Mg., sh., '96; Lucilia cornicina F., sh., '95, '96; Phora sp., '95; Coelopa sp., fp., '95; Sepsis nigripes Mg., sh., '95, '96; and another sp., '95. **C.**: Apion nigritarse K., sh., '95. **T.**: Thrips sp., sh., '95, '96.

[*Stellaria Holostea* L.—**Ds.**: Sepsis nigripes Mg., '96. *Oxalis*

Acetosella L.—**C.**: Meligethes picipes Sturm, sh., '96. **T.**: Thrips sp., '96. *Ribes Grossularia* L.—**Hs.**: Vespa sylvestris Scop., sh., '96. **Ds.**: Scatophaga stercoraria L., sh., '96. To *Ranunculus bulbosus* L., *Sisymbrium Alliaria* Scop., and *Fragaria vesca* L., no visitors.]

(To be continued.)

SHORT NOTES.

Bedfordshire Plants.—*Fontinalis dolosa* is plentiful in ponds at Limbury, occasionally fruiting. First record, 1882. I owe it to Mr. H. N. Dixon that this form has been distinguished by Mr. Cardot from *F. antipyretica*. — *Orthotrichum pulchellum β. Winteri*. On elder trees near water, Luton Hoo Park; July, 1892. First discovered by my son Edgar.—*Riccia fluitans*. Plentiful in a pond by the island in Luton Hoo Park; Sept. 1896. Specimens of the above three species are sent for the British Museum Herbarium.—James Saunders.

Hybrid Forms of Pyrus.—At the meeting of the Edinburgh Botanical Society on Jan. 11th, a communication by Prof. Koehne on some forms of the *Aria* section of *Pyrus* was read. The observations were made on a number of specimens collected by Dr. Landsborough of Kilmarnock, in Arran, last year (which were transmitted by Prof. Balfour to Prof. Conwentz, of Dantzic, an authority on the genus), and also on specimens collected by Rev. Augustin Ley in Breconshire. According to Prof. Koehne, the whole of the forms received by him from Breconshire and Arran belong to two species, viz. (1) *Aria suecica* Koehne (*Cratægus Aria* var. *suecica* L.; *Pyrus intermedia* Ehrh.; *Sorbus scandica* Fries; *P. decipiens* Bechst.; *Aria scandica* Decne.; *P. scandica* Babingt.); and (2) *Sorbus Aucuparia* (*Pyrus Aucuparia* Gaertn.). Of the two specimens mentioned by Prof. Koehne as having been received from Breconshire, one (collected from a limestone cliff near Merthyr Tydvil by Mr. Ley on May 28th, 1896) he believes to be the typical *Aria suecica* Koehne; while the other he considers to be a hybrid between that species and *Sorbus Aucuparia*, but very closely related to the former. All the Arran plants he declares to be hybrids. Two from Glen Catacol he considers to be the typical hybrid *Aria suecica* × *Sorbus Aucuparia* (*Cratægus Aria* var. *fennica* L.; *Sorbus hybrida* L. & W. Koch; *S. fennica* C. Koch); while all the others he considers to be intermediate forms between this and *A. suecica*. It would therefore appear that *A. suecica* Koehne had not been collected in Arran by Dr. Landsborough; and as Prof. Conwentz, when he visited the Royal Botanic Garden, Edinburgh, last year, did not find that species in the herbarium, there seems to be some doubt as to its occurrence in Arran, especially as the collection contains a considerable number of specimens of what are supposed to be that species from various parts of the island. Prof. Koehne further remarks that, he is persuaded that if a careful search be made, intermediate forms between the typical hybrid and *S. Aucuparia* will be found, and he states that these forms are scarcely to be distinguished from *S. Aucuparia*, since they have completely pinnate leaves, in which, however, the upper leaflets are a little decurrent on the midrib of the compound leaf, or are slightly fused together.

A Correction. — In the list of microscopic fungi published in this Journal for January (p. 7) I stated that the genus *Piptocephalis* had not been previously recorded for Britain. I relied on a statement in Massee's *British Fungi* (*Phycomycetes* and *Ustilagineæ*), 1891 (p. 106), that *Piptocephalis* had not yet been found in this country. There is, however, a record of *Piptocephalis Freseniana* De Bary in this Journal for 1884, p. 136. The plant was found by Mr. Grove at Edgbaston.—A. L. Smith.

NOTICES OF BOOKS.

The New "Index Kewensis."

Royal Gardens, Kew. Bulletin of Miscellaneous Information. No. 121. January, 1897. DXLI. List of Kew Publications, 1841–95. [Compiled by B. D. Jackson; preface by W. T. T. Dyer.] Price Fourpence.

We are sorry that Mr. Jackson, who has done much useful work, and from whom much more may be expected, should have wasted any portion of his valuable time over this List. One great achievement, the curiously-named *Index Kewensis*, lies behind him; it is understood that he has in contemplation another undertaking of equal usefulness and almost equal magnitude in a new edition of "Pritzel." If we are not mistaken, too, it was announced long since that Mr. Jackson had a life of Banks in preparation; and we know that Sir Joseph Hooker, who has himself recently done much to raise Banks in the estimation of scientific men, is most anxious that this biography should be taken in hand by one who may be trusted to do justice to his subject. When, therefore, we see Mr. Jackson's name associated with such a list as this, we feel inclined to adapt the words of the judge who said—"Prisoner, you have received a good education, and a brilliant career lay open before you, instead of which you go about the country stealing ducks." If Mr. Jackson wanted some lighter work by way of relaxation before buckling to more important tasks, he might have found it in the preparation of a general index to the various Kew Journals of Botany, not one volume of which is adequately indexed; or we should have welcomed his help in a similar compilation for our own Journal. The former might have been included among the "miscellaneous information" to which the *Bulletin* is devoted, and would have been welcomed by botanists in general; while it is difficult to see of what possible use this list of Kew publications can be to any one except those whose names figure in it, who may like to be reminded of their youthful exploits.

Dr. Dyer, in his prefatory remarks, says that the "volume of work" represented by the List "probably is not surpassed by that of any other institution in the world." He can hardly mean this to be taken literally. One section alone of the British Museum—that of Natural History—has an output which, measured by bulk alone, enormously exceeds that of Kew Gardens; and the nineteen-page list of Natural History Catalogues consists mainly of serious publications of some hundreds of pages, whereas a very large proportion of the papers in the Kew List are of one or two pages, or of even less bulk. Moreover, the Museum list is confined to catalogues of the Museum collections; and although their authors contribute to current literature, such contributions are not claimed as Museum work. If Mr. Jackson had constructed his list on similar lines, it would have assumed comparatively small dimensions, but would more accurately have represented the work done at Kew. It is ridiculous to class such papers as Mr. Hiern's 'Note on Botanical Nomenclature,' Mr. Hemsley's 'School Gardens in Sweden,' or Mr. Dyer's 'Joseph Decaisne' among the publications of Kew Gardens. But the climax of absurdity is reached when we are called upon to regard a speech by Sir John Lubbock in the House of Commons in 1872 as a Kew publication; if this finds a place, it is difficult to see on what grounds Mr. Jackson excludes the numerous questions and answers in the same illustrious assembly as to the delay in publishing various Kew Guides and Colonial Floras.

Even from a bibliographical point of view, the List is badly done. According to the prefatory note, it is confined to "smaller publications either by members of the Kew staff or by other botanists working there"—*i. e.* at Kew; "articles of merely ephemeral interest have not been included in the list." Let us take the various heads of this definition. The "smaller publications" include the *Botanical Magazine*, the *Genera Filicum* (these stand first and third on the list), the *Botany of the Antarctic Voyage*, *Victoria regia* (an elephant folio!), *The Rhododendrons of Sikkim Himalaya*, and the like: if these be smaller publications, what are large ones? It is not easy to see why such papers as that published by Mr. Dyer in this Journal for 1871 on Oxford plants are included, for Mr. Dyer was not then a member of the Kew staff, and the only herbarium referred to in the paper is that of the British Museum. But, this being included, one wonders why the excellent adaptation of Figuier's *Vegetable World*, "revised by an eminent botanist," and published in 1872, is omitted from the enumeration of Mr. Dyer's works. The exclusion of "articles of merely ephemeral interest" is purely theoretical—surely no more extensive collection of pot-boilers was ever brought together. The *Gardeners' Chronicle* says: "The selection, if anything, errs on the side of over-elasticity"; and every page gives abundant examples of articles harmless enough, and even useful in their way, which "had their day" and might well have "ceased to be." Is a column of notes on "Hardy Water and Bog-loving Plants" of such lasting importance that Mr. Jackson should have thought it worth while to explain that its author was "D. D[ewar]"? And—to take half a dozen titles literally at random—does any one suppose that Mr. J. R. Jackson's "Pine Wool Carpets," Mr. Nicholson's "History of the White Lilac Industry," Mr. Watson's "Plants in Flower at Kew," Dr. Dyer's "Effect of Past Winter on Shrubs at Kew," Mr. Hemsley's "Ornamental Grasses and Sedges [from the German of C. Bouché]," or the same author's "A Graceful Wall or Rock Shrub," are of permanent value? Yet the eighty-four pages absolutely teem with pot-boilers of this kind—things which assuredly in most cases their authors will have forgotten almost before the money received for them has been spent. One wonders what are the "articles of merely ephemeral interest," if those just cited are of lasting renown. Their inclusion makes certain omissions the more remarkable—the Editor of this Journal, for example, during his two years at the Kew Herbarium, printed several notes which are included in the Royal Society's *Catalogue of Scientific Papers*, but his name does not appear in Mr. Jackson's list. A more noteworthy omission is that of Mr. Baker's monograph of Brazilian Ferns, published in the *Flora Brasiliensis* in 1870.

It is naturally a matter of gratification to us to notice how large a proportion of the more important papers in the list have been published in this Journal. We find, however, no reference to the fact that for some years Kew was represented on the editorial staff by Mr. J. G. Baker (1870–75) and Mr. Spencer Moore (1877–79).

The papers are arranged alphabetically, each year being treated separately. But instead of the author's name standing boldly at the beginning of each line, as it does in every good catalogue, it comes after the title. This arrangement makes the list extremely difficult to consult, as any one who tries to use it will at once discover. There is no sort of index, although one is foreshadowed in a somewhat enigmatical sentence in the *Gardeners' Chronicle*, which runs: "The arrangement is chronological, an inconvenience not compensated for by the presence of an index of names and subjects which we hope may be supplied on another occasion." At present, supposing that anybody wants to know what some one more or less connected with Kew wrote upon some subject having some (or no) connection with the Royal Gardens, he may possibly be able to find it should he happen to know the year in which it was published, always supposing that the contribution was not too "ephemeral" for inclusion, or had not been overlooked. It may be possible to limit the usefulness of any publication more strictly than this, but we doubt it; yet it must be remembered that the *Times* has told us that "no reasonable man can doubt that the publication of the *Bulletin* is one of the most useful functions discharged by Kew Gardens"!

A list of this kind might have been of some service if it had supplied information on sundry small but important points connected with the dates of publication of certain Kew works—such, for example, as the dates of the parts of the *Flora Antarctica*. In any case, erroneous statements should have been guarded against—such as entering Nos. 97–108 of the *Bulletin of Miscellaneous Information* as published in 1895, when the last bears on its front page the date of January, 1896.

It is, we think, evident that Mr. Jackson should have exercised a more rigorous selection in the papers he has included. Nothing is more unwise on the part of a biographer than the dragging to light of early papers which their writer would willingly let die: early fragments which may indeed have given a promise of genius, but a promise which has long since been forgotten in the performance. The enthusiastic panegyrist thinks to give credit to his subject by the unearthing of some newspaper article or unsigned essay, unconscious that by this action he can add nothing to a reputation based on the author's finished work, and may indeed even detract from it. In a similar way Dr. Dyer has, we think, reason to complain that the imprudent enthusiasm of his bibliographer has placed him in a somewhat false position. Thus, to take the entries on one page, he is credited with a paper on "Peat-floods in the Falklands," and another bearing the exciting title "Collection of Hairs after Earthquakes in China." The latter consists of two extracts—one from Dr. Macgowan, the other from Fortune—Dr. Dyer's share in the paper attributed to him being practically confined to the sentence—"I think there can be little doubt that Dr. Macgowan's conclusion is well founded, and that the 'white hairs' have no real connection with the earthquake." The former is a reprint of two Colonial Office papers by the Governor and Acting Governor of the Falklands, to which Dr. Dyer contributes a prefatory note of ten lines!

It is only fair to say that Dr. Dyer's contributions to botanical literature are not to be judged by these examples, which, however, afford some indication of that versatility which is further evidenced by the list of his papers. It is doubtless owing to this, and to the frequent indulgence of his natural tendency to advise and to direct the work of others, that we find few papers of more than third-rate importance among these contributions—none, indeed, worthy of the capabilities which Dr. Dyer undoubtedly possesses. The control of a large garden is also no doubt a great tax upon its director, although Dr. Dyer's illustrious predecessor contrived to find time for most of his work on the *Genera Plantarum*, as well as for numerous memoirs and monographs; and it was under his direction that Kew attained the important position which it still occupies. But, considering his splendid opportunities for investigation, we may yet hope for some work from Dr. Dyer's pen which shall carry on the traditions of the Hookers, and remain a lasting monument of his directorate.

The Energy of Living Protoplasm. By OSCAR LOEW, Ph.D., Professor in the Imperial University, Japan. London: Kegan Paul & Co. 1896. 8vo, pp. iv, 115. Price 2s. 6d.

A TREATISE on one of the most modern questions of modern science by a German Professor in a Japanese University, printed in English at Tokio and published by a London house, is somewhat of a novelty. To Kokubunsha (the printer) we would suggest that with a little more pressure when printing and a little care in getting the type straight he will do very well; also, if he is responsible for the binding, that, owing to the rough and ready fashion in which the sheets are wired together, it is difficult to keep the book open. We have read Prof. Loew's chapters with considerable interest. Many of the ideas are not new, and there are copious references to periodicals, chiefly German, embodying previous work of the author and other scientists. It is evident, however, that Prof. Loew has interested several Japanese men of science in the same train of research, for repeated reference is made to results obtained by them.

This Journal is not the place for an exhaustive account of the contents of this little book. To what does protoplasm owe its vital properties? Wherein lies the difference between proteids and protoplasm? These questions the author seeks to answer. "From a series of well-established facts, and guided by simple chemical laws, I have framed," he says, "a hypothesis as to the formation of albumin, and as to the existence of a labile and stable modification of it. The labile form, which would lead to living matter, was designated by myself as *active* albumin, in contradistinction to the stable, ordinary, *passive* albumin stored up in seeds and eggs." This "active albumin" is of widespread occurrence in plants, and plays the part of a reserve material. It is stored generally in the vacuole, and is separable in the form of droplets, "proteosomes," by certain organic bases, such as caffeine or antipyrine in ·5 per cent. solution. Prof. Loew also says a good deal in support of formic-aldehyde as the first step in constructive metabolism. But those who would follow him in his argument must buy the book and read for themselves.

A. B. R.

Physiologische Pflanzenanatomie. Von Dr. G. Haberlandt. Zweite, neubearbeitete und vermehrte Auflage. 8vo, pp. xvi, 550; tt. 235. Leipzig: Engelmann. 1896. Price 16 marks.

Coming generations of botanists will look back to our time as one characterized by the want, among many other needs, of a coherent system of plant-anatomy. We have a great many facts, but we do not know how to arrange and correlate them. We have our De Bary, but are not satisfied with it, thinking to see in stelar theories and the like the dawning of more logical days. Whatever the future may have in store for us; whether or no the systematist of twenty years hence may have to include anatomical details in his diagnoses; one thing is certain—plant-physiology and plant-anatomy must always be to some extent studied together. Hence books like the one which calls for this note will always be extremely useful to teachers and students. The correlation of structure and function supplies an intelligent method of study, and makes the subject of interest to the beginner. It is more than twelve years since the earlier edition of the book appeared; it is not therefore surprising to find that a new edition has involved a considerable increase in the size, that of 1884 containing only 398 pages and 140 figures. Besides the incorporation of the results of recent investigations, an introduction to the whole has been added, and a new section (number eleven), entitled "Apparate und Gewebe für besondere Leistungen." The latter deals with means of attachment by hairs, mucilage, &c.; mechanisms of movement, whether passive, like hairs or membranous expansions, or active, like hygroscopic contractions; means for receiving stimuli (*e.g.* the hairs on the leaves of *Dionæa*) and tissues along which the stimulus may be supposed to travel. The chapter on the structure and functions of the typical plant-cell has been extended; and the two sections dealing with normal and abnormal thickening have been united under a common head, "Secondary Growth in Thickness," so that the number of sections (twelve) remains the same as in the edition of 1884. The majority of the additional figures are original.

A. B. R.

Index Desmidiacearum citationibus locupletissimus atque Bibliographia. Auctore C. F. O. Nordstedt. Berolini: Fratres Borntraeger. 1896. 310 Seiten. 4°. Preis 20 mark.

The author treats of his subject under five sections. The first of these is the bibliography, and, including the two pages of addenda constituting the third section, it may be said to be complete up to about September, 1896, being in fulness and general accuracy of reference much superior to previously published lists of Desmid literature. The second section, the Index, consists of an alphabetically arranged list of the generic and specific names of Desmids and some doubtful structures which have been described as such. Under each specific name is a chronological series of records of that species, varieties and changes of generic position each being marked by special type, and the nature of each record is indicated by means of contractions, a list of which is given in the Preface. Thus, to take an example, on p. 10, under "*dissiliens*," is found the reference "ph z f 57—*Hofm.* Fortpl. p. 35 t. 1 f. 5–8," indicating that Hofmeister's paper was published in 1857 with some physiological observations, description of zygospores, and figures. The change of type on the subsequent recording of a variety serves its purpose very well, but fails to do so in those instances in which more than one variety has been given the same name by different authors. Thus on p. 37, under "*acerosum*," there are two varieties with the name "*elongatum*," and as only one of these (the first mentioned one) is in the usual strong type, the other is liable to be overlooked. This change of type is accompanied by a change of the authority from the original describer to the recorder; thus on p. 87, under "*crassum*," is found the var. *scrobiculatum* with the following authorities,—"Lund.," "Nordst.," "Wolle," "Lagerh.," and "Toni." From this one might be led to infer that each of the above described a var. *scrobiculatum*, and that it was a similar case to that mentioned as occurring on p. 37.

The author's suggestions, short notes, and cross-references add considerably to the usefulness of the Index; and the last section of the work, consisting of an alphabetical enumeration of the genera with their contained specific names, will also be found extremely useful for purposes of reference.

A work of this kind has long been needed, and in the absence of any standard up-to-date work on this subject, all students of Desmids will welcome the appearance of the present 'Index.' In order to fully appreciate the immense convenience to the working botanist in thus having collected together all the important records of a species, together with its varieties and forms, there is required by the student a considerable amount of previous work, entailing multitudinous references to the scattered and ever-spreading literature on the subject. Every credit must be given to the author for the excellent manner in which the book has been compiled, as well as for the immense labour expended in its compilation, and those who know with what care and exactitude Dr. Nordstedt has studied these minute plants, will agree with me in saying that no one was more competent to produce such a work than the author.

G. S. West.

The Nursery Book: a complete Guide to the Multiplication of Plants. By L. H. Bailey. 3rd edition. 4s. net. Macmillan & Co.

We have here another of the excellent practical handbooks of the "Garden Craft" series. It appeals to the practical gardener whose chief duty is connected with the multiplication—or, as it is more technically termed, propagation—of plants. About 156 pages are devoted to the explanation of the various modes of increasing plants; and in just over 190 pages are mentioned the principal genera of plants in alphabetical order, with short notes after each indicating the most suitable mode of treatment. As many as 152 woodcuts supplement the already lucid explanations. The work is not a mere compilation; the facts recorded have been proved from practical experience in the gardens of the Cornell University. Anyone who is acquainted with the "bulletins" issued from that establishment, chiefly under the direction of Prof. Bailey and his able assistants, will at once recognize the trustworthiness of the information supplied; and as the same principles regulate the growth of plants in England as in America, the British gardener cannot but gain by consulting them.

There is one small drawback to the "Nursery Book," viz. the "Americanisms"—we use this term for want of a better—employed. To gardeners on this side of the Atlantic it sounds exceedingly strange to talk of "seedage," "layerage," "cuttage," "buddage," "graftage," and such-like terms. We have almost got accustomed to seeing "cion" for scion; but we doubt the wisdom of coining fresh terms which are at least no improvement on the older ones. If this sort of thing goes on, we shall soon have "pottage" for potting, "waterage" for watering, "crockage" for crocking pots, "prunage" for pruning, and so on.

With the exception of this question of terms we have nothing but praise for the "Nursery Book"; and we hope that when the fourth edition appears there may be a reversion to the ordinary nomenclature of garden operations.

J. Weathers.

A Gardener Botanist.

The Survival of the Unlike, a Collection of Evolution Essays suggested by the Study of Domestic Plants. By L. H. Bailey. New York: The Macmillan Company. 1896. Pp. 515.

Having, it must humbly be confessed, had somewhat more than our fill of theories of evolution, we turn from the first portion of this book, which deals with yet another hypothesis to explain the all-embracing process, to the second, which treats a variety of points connected with the facts of development as they are to be observed in gardens. Of the more philosophical portion of Mr. Bailey's work, and especially of the essay from which the whole collection is named, and which appears to contain the pith of his system, we need only say that we find it hard to feel sure that we apprehend his main contention, and that if we have apprehended it, we are unable to agree with him.

But in the practical portion, where he entertains us with specimens of his horticultural experience, we find him a delightful companion, no less instructing than entertaining, and learn many pregnant circumstances concerning the marvellous plasticity of nature under the hand of man.

In a charming essay, for example, entitled "The Progress of the Carnation," we are led to follow the process by which that handsome flower has been induced to adapt itself to a type arbitrarily predetermined by man. He made up his mind that its blossom should be flat, and a century ago forced it to be so by means of a disc of cardboard beneath the lower petals, on which all petals were artificially "placed" with tweezers as fast as they appeared, any which refused to conform being removed. Now well-bred carnations grow in the same form of their own accord. Similarly, it has been always held for a point of perfection that the flower should be full, yet the calyx should remain entire, or at least should not burst, but to secure this it was necessary to bind the calyx with cord, or else to slit it with a penknife. Now a good carnation is expected to be a "whole flower" without artificial help.

Another most interesting question is introduced in connection with grapes and plums. The varieties of these fruits cultivated in America have been usually of European derivation, the long period of Old World cultivation having developed qualities which are not to be obtained, at least in similar perfection, from native stocks. But experience appears to show that with all their advantages the immigrants will have to yield to the aboriginals. The former are liable to diseases which the others can defy, having already outgrown them in their ancestral experiences of New World conditions. The thing therefore, Mr. Bailey contends, for American nurserymen to do, is to make sure of the best native originals upon which to exert their art. In some instances, where a good variety has appeared, it has been found difficult or impossible to trace it to its ultimate source. This has been the case, for example, with the "wild-goose plum," the history of which is picturesque. A man shot and buried a wild-goose, and from its grave there sprang up in the following season a plum-tree, which bore good fruit. The bird presumably had been feeding on wild plums, and from a stone concealed about its person at the time of its death the tree had issued. But wild-geese are wanderers, and their powers of flight are great, so that it was impossible to say where this one had last regaled itself, while the sort of plum on which it had fed does not seem yet to have been identified.

On the subject of the strawberry, Mr. Bailey makes an historical statement to which we must take exception; it seems at least misleading. The earliest attempt, he tells us, at the methodical amelioration of this fruit by cultivation was made little more than two centuries ago, about 1660. It is true that the varieties now cultivated may have been introduced so recently, for they all come from America, and their merits are not likely to have been discovered till that continent became well known. But if wild American strawberries appeared in gardens only in the middle of the 17th century, wild native strawberries were there two centuries earlier, and to some degree were ameliorated by man's care. For this we have the evidence of Shakespeare, who makes King Richard III. remark on the "good strawberries" he had seen in the Bishop of Ely's garden, in Holborn. This little episode, it is needless to remark, is not of Shakespeare's imagining. He found it in Sir Thomas More's history, and Sir Thomas as a youth lived in the household of Cardinal Moreton, from whom he is supposed to have obtained his materials, and Moreton was the very Bishop of Ely in whose garden these strawberries grew. At the same time, it would appear that our indigenous strawberries were not very amenable to the cultivator's art, for old Fuchs observes that strawberries grow in gardens, but better in woods.

It would be easy to go on in Mr. Bailey's company to the discussion of other points and problems,—in fact, the only difficulty is to stop. We should much like to say something on the vexed question of the permanence of varietal forms, which suggests itself in connection with many flowers and fruits, and especially with the apple. Does a variety which depends for its propagation on grafting, or any similar process, tend inevitably to run out? or is it as stable as if propagated in orthodox fashion, by seed? In other words, does a graft start a new life, or merely carry on an old one? To such a question different answers are given, whether by theorists or practical men, and accordingly it seems useless to start a discussion from which probably there will be no definite result. An interesting question it is, nevertheless, and in this respect it does but resemble many others which arise from the perusal of this very interesting book, which we trust we have said enough to commend to the attention of our readers.

JOHN GERARD.

A Manual and Dictionary of the Flowering Plants and Ferns. By J. C. Willis, M.A. Vol. I. pp. xiv, 224; Vol. II. pp. xiii, 429. University Press, Cambridge. 1897. Price 10s. 6d.

Mr. Willis emphasises the importance of the study of evolution in botany, and deplores the lack of an evolutionary basis in our existing text-books of morphology. For topsy-turvy evolution in the matter of manuals, we call to mind none which can equal his own. Part I., we are told in the Preface, was written as a supplement to Part II., as the latter was "wanting in co-ordination." Part II. has therefore two supplements, one following it in the normal position, the other—Part I. The Index to the two volumes is, according to the table of contents, Part III., though the printer has forgotten to label it thus. We will arrange our remarks in phylogenetic sequence. First, as to the main book, Volume II. This is one of the most useful works on plants that has ever been produced. The author modestly admits it to be a mere compilation. But it is a compilation from the very best sources, with the matter well selected, and the information given in a clear and concise manner. Numerous cross-references enable us to get the most out of the volume itself, and if we want to know more, Mr. Willis tells us where to look for it. The book consists of an alphabetical arrangement, under their Latin names, of the classes, cohorts, orders, and chief genera of seed-plants and ferns. Very full accounts are given of the larger divisions, and also of the more important genera, especially those of economic value. The interest is greatly enhanced by the insertion of facts of biological importance, so that one can turn over the pages for a long time without getting bored. To such a list it is of course easy to suggest certain additions, alterations, &c. Under the monotypic palm-genus *Jubæa* reference should have been made to the little coconut-like fruits which come into the London market, the source of which often puzzles people. Under *Sequoia* we are told that "in most museums in Britain there are sections of a tree cut down in 1882, and showing 1335 annual rings." The only place in Britain, or the Old World for the matter of that, where a complete section showing 1335 annual rings can be seen, is in the great hall at the Natural History Museum in the Cromwell Road, which, judging from internal evidence, the author seems never to have visited. Fragments of the original block have been distributed among a few other museums, but these can give but little idea of the immense bulk of the Californian Big-tree.

Before leaving Volume II., we would humbly suggest to the people at the University Press, Cambridge, that they would confer a great boon on students of botany if they would issue it separately at (say) five shillings.

As to the supplementary Volume I. Authors of text-books which have appeared during the last two or three years will be pleased to read that our existing text-books of morphology are not only wanting in evolutionary basis, but also "mostly out of date." To these insufficiences in the modern text-book, and the want of co-ordination in Part II., we owe the appearance of Part I. As regards co-ordination, nobody expects co-ordination in a dictionary. As to the value of Part I. as a text-book, it is a very unequal production. The portion dealing with the flower is excellent and suggestive; the chapter on forms of vegetation and distribution is useful; but the account of the morphology of the vegetative organs is scrappy and uncertain, and reminds us more of lecture notes than a chapter of a text-book. In the few pages devoted to botanic gardens will be found an indication of the arrangement at Kew and Cambridge, and what may be seen in the different houses and beds. We would like to add, in view of the generally admitted great dearth of young systematists, to which reference is made in the Preface, that there is an institution, easy of access, and well-known to London and even to some Cambridge students, which still encourages the study of systematic botany. We mean the Botanical Department of the British Museum, where, and where alone, the student finds a complete exposition of the natural orders of seed-plants, as well as a good illustrative series of the cryptogams.

A. B. R.

Botanical Microtechnique. By Dr. A. Zimmermann. Translated by J. E. Humphrey, S.O. 12s. net. Archibald Constable & Co. 1896.

The publishers advertise this book as "a new volume of exceptional importance and value to students." It is not necessary to discuss what special meaning the publishers may attach to the word "new"; but it must be pointed out that the book is not new in any ordinary sense of the word, for this translation was published in New York, by Henry Holt & Co., in 1893. The only difference in the volume now before us is that the former publisher's name has disappeared from the title-page, and is replaced by that of A. Constable & Co.; and the text and pagination are exactly the same.

Though a very good and useful book, it can hardly be recommended to students. Those workers to whom it is useful would either read it in the original German or would know of the existence of the earlier version in English, so that the object of its republication in England is not very clear.

V. H. B.

ARTICLES IN JOURNALS.[*]

Bot. Centralblatt (Nos. 5–8). — E. Küster, 'Die anatomischen Charaktere der Chrysobalaneen' (concluded).

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[*] The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Botaniska Notiser (häft. 1). — N. Wille, 'Om Færöernes Fernskvandsalger og om Fesrkvandsalgernes Spredningsmaader' (1 pl.). — A. H. Nilsson, 'Iakttagelser öfver de mörka värmestrålarnes i solljuset inflytande på växternas organisation.'

Bot. Zeitung (Feb. 16). — L. Jost, 'Ueber die periodischen Bewegungen der Blätter von *Mimosa pudica* im dunkeln Raume.'

Bull. de l'Herbier Boissier (Jan.).—G. Hochrentiner, 'Phanérogames du Rhône' (1 pl.). — A. Tonduz, 'Herborisations au Costa-Rica.'—P. Conti, 'Du genre *Matthiola.*'—G. Rouy and J. Briquet, 'Dênomination binaire dans la Nomenclature.'

Bull. Soc. Bot. de France (Nov. & Dec.: vol. xliii. pt. 8).—P. Magnin, 'Revision des Potamots de France.'—L. Planchon, 'Ouverture des fleurs de l'*Œnothera Lamarckiana.*'—A. Battandier, 'Quelques plantes d'Algérie.' — A. Franchet, '*Gentiana* nouveaux de la Chine occidentale.' — E. A. Finet, *Ornithochilus Delavayi*, sp. n. — Id., 'Le genre *Yoania.*' — P. Vuillemin, '*Cladochytrium pulposum*, parasite des betteraves.' — H. Coste, 'Cinq plantes nouvelles découvertes dans l'Aveyron.' — L. Lutz, 'Gommose dans l'*Aralia spinosa.*'—E. Bureau & F. Camus, 'Sphaignes de France.' —M. Cornu, *Quassia africana.*—P. van Tieghem, 'Phanérogames à ovule sans nucelle' (*Santalaceæ*). — G. Rouy, 'Revision du genre *Onopordon.*' — D. Clos, *Erodium cicutarium* & *Ecballium Elaterium.* — A. Chabert, *Tetragonolobus Regnieri.* — A. Chatin, *Terfezia Gennadii.*

Bull. Torrey Bot. Club (Jan. 28). — P. A. Rydberg, 'Notes on *Potentilla*' (2 pl.). — A. M. Vail, 'Notes on *Parosela*' (*Dalea*).—C. Mohr, Alabama Plants (3 pl.). —F. S. Earle, 'Fungi imperfecti from Alabama.' — G. V. Nash, 'New American Grasses.' — J. K. Small, *Prunus Gravesii* & *Polygonum fallax*, spp. nn.—Id., *Thysanella* & *Polygonella.* — B. D. Halstead, Pods of *Wistaria.* — G. E. Osterhout, *Gilia laxiflora*, sp. n.—N. L. Britton, *Cratægus Vailiæ*, sp. n.

Erythea (Jan. 31).—W. L. Jepson, *Peucedanum erosum*, sp. n.—A. J. Merritt, 'Pollination of Californian mountain flowers' (cont.). —J. B. Ellis & B. M. Everhart, 'New W. American Fungi' (cont.).

Gardeners' Chronicle (Jan. 30). — *Cleisostoma Zollingerianum* Kränzl., sp. n. — (Feb. 13). 'An old Album of Floral Drawings' (by Holtzbecker, 1660, in Department of Prints and Drawings, British Museum).—(Feb. 20). *Polystachya pleistantha* Kränzl., sp. n.

Nuovo Giorn. Bot. Ital. (Jan.). — K. Müller, 'Prodromus Bryologiæ Bolivianæ.'—F. Tassi, 'Micologia della provincia Senese.'—E. Baroni & H. Christ, 'Filices plantæque Filicibus affines in Shen-si septentrionali collectæ' (3 pl.). — C. Massalongo, 'Intorno all' acarocecidio della *Stipa pennata*' (1 pl.).

Oesterr. Bot. Zeitschrift (Feb.). — W. Schmidle, *Gongrosira trentepohliopsis*, sp. n. — H. Fritsch, *Cardamine Fialæ*, sp. n.—J. Brunnthaler, *Pogonatum nanum* × *aloides.* — A. Hansgirg, 'Zur Biologie des Pollens.' — A. van Degen, *Peucedanum obtusifolium.*—V. Schiffner, 'Bryologische Mittheilungen aus Mittelböhmen.'

BOOK-NOTES, NEWS, &c.

Dr. John Leitch, who died at Silloth, Cumberland, on Dec. 22nd, at the age of forty-seven, had a large collection of plants, mainly collected by himself in various parts of Great Britain and Ireland, and in the Channel Islands. Although he did not publish, he had an extensive knowledge of British botany, to which he devoted all his spare time. He was born at Monimail, Fife, and graduated M.B. at Edinburgh in 1871.

Drs. Errera and E. Laurent have recently published a series of fifteen diagrams illustrating plant-physiology (*Planches de Physiologie Végétale:* Bruxelles, Lamertin), accompanied by a volume of descriptive text in French, the explanations of the plates being also in English and German. Among the subjects illustrated are nutrition, respiration, transpiration, fermentation, geotropism, heliotropism, growth; as well as carnivorous plants, saprophytes and parasites, twining and climbing plants, and the variability of species. The diagrams are of the size of the well-known ones of Kny, and, although not equal to those in execution, they are clear and telling, and their cheap price renders them additionally serviceable. The text is accompanied by reduced figures of the objects figured in the diagrams.

A botanical laboratory in the western tropics has long been greatly needed, and we have much pleasure in announcing that the establishment of such an institution is completely assured. This is entirely owing to the enterprize of American botanists, and in particular of Prof. MacDougal, of the University of Minnesota, Minneapolis. He has obtained the necessary funds for the laboratory, and intends during the summer, with aid of a representative commission from the United States, to examine various regions in search of a suitable site. It is believed that cordial co-operation on the part of botanists in this country would be welcomed. In order to secure this co-operation, we venture to recommend one of the lesser Antilles as the site. These islands are only a fortnight from London, and their botanical attractions for future work are great—a fact testified to by recent papers by Spruce on the Hepaticæ in the *Journal of the Linnean Society*, and Wainio on the Lichens of Dominica in this Journal for 1896; to which may be added the further fact that Dr. Stephani announces yet more novelties in the way of Hepaticæ about to be published from the same island. A site in Mexico, for example, though much to be recommended on other grounds, would be a hindrance to co-operation on the part of botanists in this country, on account of the length of the journey. We heartily congratulate American botanists on this manifestation of their enterprize, and wish it the success it undoubtedly deserves.

Several reviews stand over: among them notices of the Rev. R. P. Murray's *Flora of Somersetshire*, and of Mr. W. R. Clarke's *First Records of British Flowering Plants*, which British botanists will be glad to have in a connected form.

WELWITSCH'S AFRICAN FRESHWATER ALGÆ.

By W. West, F.L.S., and G. S. West, A.R.C.S.

(Plates 365–369.)

(Continued from p. 89.)

12. Cosmarium Corda (1834).

1. **C. centrotaphridium,** sp. n. (tab. 367, figs. 3–6). C. submediocre, paullo longius quam latius, profunde constrictum, sinu angusto-lineari; semicellulæ subtrapeziformes, angulis inferioribus late rotundatis, lateribus leviter divergentibus ad basin et subretusis apicem versus, angulis superioribus rotundatis et leviter productis, apice subtruncato cum elevatione lævi lata ad medium, seriebus transversis duabus scrobiculorum trans centrum semicellularum (in serie unaquaque 4, sæpe subirregulariter ordinatis); a vertice visæ oblongæ apicibus obtuse acutis, scrobiculis 4 in medio utrobique; a latere visæ subrotundæ elevationibus latis tribus ad apicem; membrana minute punctata, præsertim ad angulos. Long. 44–46 μ; lat. 34·5–40 μ; lat. apic. 25–28 μ; lat. isthm. 11·5–12·5 μ; crass. 21–23·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15.

The apex is subrectangular with a broad elevation at each angle and another elevation in the centre, the latter not being as high as those at the angles. The four pairs of scrobiculations are somewhat variable (cfr. t. 367, f. 4–6); sometimes there are three in place of either or both of the two central pairs.

2. C. sublobatum (Bréb.) Arch. in Pritch. *Infus.* 731 (1861). *E. ? sublobatum* Bréb. in Ralfs, *Brit. Desm.* 91, t. xxxii. f. 4 (1848).

Var. crispulum (Nordst.) De Toni, *Syll. Alg.* 1042. *Euastrum sublobatum* Bréb. *β. crispulum* Nordst. in *Acta Univ. Lund.* ix. 10, t. i. f. 9 (1873). Long. 25–29 μ; lat. 16–17 μ; lat. isthm. 4–4·5 μ; crass. 9·5 μ. This variety is probably a *Euastrum.*

Huilla. Inter *Utriculariam,* Morro de Lopollo; April 1860. No. 179. In paludibus exsiccandis; April 1860. No. 176.

3. C. retusiforme (Wille) Gutw. in *Bot. Centralbl.* xliii. 69 (1890). *C. Hammeri* Reinsch, var. *retusiforme* Wille in *Vid.-Selsk. Forhandl., Christiania,* no. 11, 32, t. 1, f. 16 (1880). Long. 15–16 μ; lat. 11–12 μ; lat. isthm. 3–3·5 μ; crass. 8 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

4. C. retusum (Perty) Rabenh. *Fl. Europ. Alg.* iii. 167 (1868). *Euastrum retusum* Perty in *Mittheil. Naturforsch. Gesellsch., Bern,* 173 (1849); non Kütz. *Phyc. Germ.* 136 (1845). Long. 30 μ; lat. 24 μ; lat. isthm. 9 μ; crass. 13·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

5. C. granatum Bréb. in Ralfs, *Brit. Desm.* 96, t. xxxii. f. 6 (1848). Long. 36·5–38·5 μ; lat. 21–23 μ; lat. isthm. 7·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

We can now add West Central Africa to the distribution of this species, and this, along with its habitats in East Africa and Madagascar, still further confirms what Lagerheim has stated with regard to the cosmopolitan nature of the species.

6. C. ANGUSTATUM (Wittr.) Nordst. in *Ofvers. K. Vet.-Akad. Förh.* no. 6, 20 (1875). *Euastrum binale* var. *angustatum* Wittr. in *Bih. t. K. Vet.-Akad. Handl.* Bd. 1, no. 1, 50, t. iv. f. 8 (1872). *Euastrum polare* Nordst. in *Ofv. K. Vet.-Akad. Förh.* no. 6, 37, t. vii. f. 24 (1872). A form with the vertical view oblong. Long. 25 μ; lat. 14 μ; lat. apic. 7·5 μ; lat. isthm. 4·5 μ; crass. 8 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

7. C. MAXIMUM (Börg.). *C. obsoletum* (Hantzsch) Reinsch, subsp. *maximum* Börg. in *Vidensk. Medd. Naturh. Foren. Kjöben.*, 1890, 42, t. iv. f. 37 (1891). C. a *C. obsoleto* differt cellulis longioribus, multe profundius constrictis, angulis basalibus spinis brevibus patentibus instructis non submamillatis.

Var. MINOR, var. n. (tab. 367, fig. 21). Var. duplo-minor et angustior. Long. 63·5 μ; lat. sine spin. 46 μ, cum. spin. 48·5 μ; lat. isthm. 10 μ; crass. 29 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

C. palustre W. B. Turn. (in *K. Sv. Vet.-Akad. Handl.* Bd. xxv. No. 5, 60–1, t. viii. f. 65 & t. ix. f. 1) has some resemblance to this species, but is proportionately broader, has a much broader isthmus like that of *C. obsoletum*, and the spines at the basal angles are strongly convergent.

8. C. LUNDELLII Delp. in *Memor. Accad. Sci. Torino*, ser. 2, xxx. 13, t. vii. f. 62–64 (1878). *C. subcirculare* W. B. Turn. in *K. Sv. Vet.-Akad. Handl.* Bd. xxv. no. 5, 52, t. viii. f. 3 & t. ix. f. 27, 37 (1892).

Var. ÆTHIOPICUM, var. n. Var. $1\frac{1}{3}$-plo longius quam latius, semicellulis latioribus apicem versus; a vertice visis late ellipticis polis rotundatis (ut in var. *madagascariense* West); membrana dense et minutissime punctata inter scrobiculos parvos. Long. 71–107 μ; lat. 61–80 μ; lat. isthm. 30–33 μ; crass. usque 54 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

Forma SCROBICULATA. Forma plus dense scrobiculata, scrobiculis in medio semicellularum multe majoribus, et isthmo angustiori. Long. 104 μ; lat. 82 μ; lat. isthm. 27 μ; crass. 52 μ.

Pungo Andongo. In stagnis prope Aubilla (Condo); March 1857. No. 177.

9. C. BAILEYI Wolle, *Desm. U. S.* 64, pl. xvi. f. 17, 18 (1884). *C. depressum* Bail., non (Näg.) Lund. Forma cellulis dente minuto ad angulum basalem unumquemque instructis. Long. 46 μ; lat. 47 μ; lat. isthm. 15 μ; crass. 23 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

Var. ANGOLENSE, var. n. (tab. 366, fig. 20). Var. major, cellulis paullo depressioribus, angulis basalibus truncato-rotundatis, dente

minuto ad angulum unumquemque. Long. 69 μ; lat. 96 μ; lat. isthm. 20 μ; crass. 40 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

Compare with *C. Baileyi* v. *major* West & G. S. West (in *Trans. Linn. Soc.* 2nd Ser. v. 246, t. xiv. f. 36).

10. C. PYRAMIDATUM Bréb. in Ralfs, *Brit. Desm.* 94, t. xv. f. 4 *a, b, c* (1848). Long. 96 μ; lat. 55 μ; lat. isthm. 20 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Etiam inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

Forma TROPICA. Forma multe major et longior, apice minus truncato. Long. 165–170 μ; lat. 86–90 μ; lat. isthm. 29–31 μ.

Huilla. Cum typ.; Nos. 176 and 179.

Var. PARALLELUM, var. n. Var. semicellulis angustioribus, angulis basalibus rectangularibus et leviter submamillatis, lateribus subparallelis, apicibus late rotundatis; membrana densissime scrobiculata. Long. 127 μ; lat. 55 μ; lat. isthm. 19 μ.

Huilla. In editis de Morro de Lopollo; Febr. 1860. No. 192.

11. C. PSEUDOPYRAMIDATUM Lund. in *Nova Acta r. Soc. Scient. Ups.* ser. 3, vol. viii. no. ii. 41, t. ii. f. 18 (1871). Long. 43 μ; lat. 24 μ; lat. isthm. 7 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

12. **C. ligoniforme**, sp. n. (tab. 367, fig. 12). C. submediocre, circiter $1\frac{1}{2}$-plo longius quam latius, profunde constrictum, sinu lineari; semicellulæ semiellipticæ, ad apicem depressæ, angulis basalibus subrectangularibus, leviter rotundatis et levissime productis; a vertice et latere visæ ellipticæ; membrana dense punctata. Zygosporæ globosæ, elevationibus mamillatis, spina supra elevationem unamquemque obsessæ. Long. 57·5–59·5 μ; lat. 37 μ; lat. isthm. 14·5–16 μ; crass. 19 μ; diam. zygosp. sine spin. 47–52 μ, cum. spin. 59–61 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15 (freq. c. zygosp.). Morro de Lopollo; April 1860. No. 182.

This species closely resembles some forms of *C. pseudopyramidatum* Lund., but is comparatively broader with wider apices, has different basal angles, and the zygospore is very different.

13. C. VARIOLATUM Lund. *l. c.* 41, t. ii. f. 19 (1871).

(*a.*) Forma scrobiculis numerosioribus. Long. 31–34·5 μ; lat. 17–19 μ; lat. isthm. 5–5·5 μ; crass. 11–13 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

Golungo Alto. Inter *Scytonema Arcangelii* ad muscos prope fontem magn. ad Bança do Soba Bango; Sept. 1855. No. 159.

(*b.*) Forma semicellulis latioribus. Long. 34·5 μ; lat. 22 μ; lat. isthm. 7·5 μ.

Huilla. Lopollo; Febr. 1860. No. 192.

14. **C. africanum**, sp. n. (tab. 368, fig. 1). C. subparvum, $1\frac{2}{5}$-plo longius quam latius, profunde constrictum, sinu lineari;

semicellulæ pyramido-semicirculares, apicibus subtruncatis, angulis basalibus rotundatis; a vertice visæ anguste ellipticæ; a latere visæ ellipticæ, membrana crassa et dense scrobiculata. Long. 36 μ; lat. 25–26 μ; lat. isthm. 11·5 μ; crass. 14 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Lopollo; Febr. 1860. No. 192.

This is somewhat like *C. nitidulum* De Not. in form, but the very thick and scrobiculate membrane easily distinguishes it.

15. **C. trifossum,** sp. n. (tab. 367, fig. 19). C. parvum, 1½-plo longius quam latius, profundissime constrictum, sinu angusto-lineari extremo ampliato; semicellulæ semiellipticæ et levissime depressæ ad apices, excavatione minime profunda in medio apicis et excavatione simili infra et juxta apicem utrobique; a vertice et latere visæ ellipticæ; membrana dense et minute punctata. Long. 19–23 μ; lat. 13·5–15 μ; lat. isthm. 2·8–3·5 μ; crass. 8·5 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179. In paludibus exsiccandis; April 1860. No. 176. Etiam in graminosis paludosis juxta rivulum de Lopollo; April 1860. No. 180.

The three shallow notches seen in the front view of each semicell are due to the presence of three grooves running at right angles to both the longitudinal and transverse axes.

16. C. GALERITUM Nordst. in *Vidensk. Medd. Naturh. Foren. Kjöben*. 1869, No. 14–15, 209–210, t. iii. f. 26 (1870). A form with more rounded sides; long. 62 μ; lat. 46 μ; lat. isthm. 16 μ; crass. 28 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

17. C. NITIDULUM Not. *Desm. Ital.* 42, t. iii. f. 26 (1867). *C. rectosporum* W. B. Turn. in *K. Sv. Vet.-Akad. Handl.* Bd. 25, no. 5, 69, t. x. f. 16 (1893). Var. minor, apicibus cellularum latioribus et constrictione multe profundiori. Long. 15–23 μ; lat. 12–16 μ; lat. apic. 7·5–11·5 μ; lat. isthm. 1·8–2·7 μ; crass. 5·5–8·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

18. C. SCENEDESMUS Delp. in *Memor. Accad. Sci. Torino*, ser. 2, xxx. 5–6, t. vii. f. 28–34 (1878).

Var. DORSITRUNCATUM Nordst. in *K. Sv. Vet.-Akad. Handl.* Bd. xxii. no. 8, 59, t. iii. f. 15 (1888). A small form with a perfectly smooth membrane. Long. 22–25 μ; lat. 26–27 μ; lat. isthm. 6·5–7·5 μ; crass. 11·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.
Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

19. **C. æthiopicum,** sp. n. (tab. 367, fig. 20). C. subparvum, circiter 1¼-plo longius quam latius, sinu lineari extremo leviter ampliato; semicellulæ hexagono-semicirculares, angulis inferioribus rectangularibus, marginibus lateralibus parallelis, marginibus superioribus rectis, apicibus late truncatis, serie plicationum longitudinalem circiter 10 juxta sed intra apicem et margines superiores; a vertice visæ ellipticæ, polis subattenuatis et subtruncatis, a latere visæ subglobosæ, elevatione lata levi infra apicem utrobique; mem-

brana punctata. Long. 34·5–42 μ; lat. 28–33 μ; lat. isthm. 14·5–19 μ; crass. 18–21 μ.

Pungo Andongo. Inter *Scytonema myochrous* v. *chorographicum* et *Dichotrichem gypsophilam* ad latera boreal. et occid. de Pedra Songue; April 1857. No. 12.

Huilla. Inter *Porphyrosiphonem Notarisii* prope lacum Ivantala; March 1860. No. 17.

In outline this species calls to mind *C. rectangulare* Grun. 1868 (= *C. Gotlandicum* Wittr. 1872), but the more angular semicells, the much broader isthmus, and the plications present on the upper half of the semicells, at once distinguish it.

20. C. PSEUDOPROTUBERANS Kirchn. in Cohn, *Kryptog.-flora von Schlesien Zweit. Bd.* 150 (1878); Nordst. in *Öfv. K. Vet.-Akad. Forh.* no. 3, 8, t. vii. f. 3 (1885). A small form agreeing with var. *pygmæum* Gutw. (*Flora glonów okolic Lwowa*, 54, t. ii. f. 9) in dimensions, but of the same form as the type. Long. 14·5 μ; lat. 11·5 μ; lat. isthm. 5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

21. C. POLYGONUM (Näg.) Arch. in Pritch. *Infus.* 732 (1861). *Euastrum polygonum* Näg. *Gatt. Einz. Alg.* 120, t. 7A, f. 9 (1849).

Var. EXILE, var. n. Var. minor, a vertice visæ sine tumore centrali. Long. 9·5 μ; lat. 9 μ; lat. isthm. 3.8 μ; crass. 4·4 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

Compare with *C. polygonum* v. *minus* Hieronymus.

22. C. ELLIPSOIDEUM Elfv. in *Acta Soc. Fauna et Flora Fenn.* ii. no. 2, 13, t. i. f. 10 (1881).

Var. MINOR Racib. in *Pamietnik Akad. Umiej. w Krakowie, Wydz. Matem.-prz.* x. (84), t. x. f. 9 (1885). *C. proteiforme* W. B. Turn. in *K. Sv. Vet.-Akad. Handl.* Bd. xxv. no. 5, 64, t. ix. f. 26 (1892). Long. 28 μ; lat. 23 μ; lat. isthm. 6 μ; crass. 14 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

23. **C. submamilliferum**, sp. n. (tab. 368, fig. 8). C. parvum, tam longum quam latum, profunde constrictum, sinu lineari; semicellulæ brevissime truncato-pyramidatæ, angulis inferioribus et superioribus rotundatis, lateribus leviter convexis, granulis duobus juxta sed intra marginem ad medium apicis latissimi; a vertice visæ ellipticæ granulis duobus ad medium utrobique; a latere visæ subglobosæ granulo prope apicem utrobique; membrana glabra. Long. 23 μ; lat. 21 μ; lat. isthm. 8 μ; crass. 11·5 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177,

This is distinguished from *C. mamilliferum* Nordst. in *Vidensk. Medd. Naturh. Foren. Kjöben*, 1869, no. 14–15, 212, t. iii. f. 22 (1870) by the very different form of the semicells in front view.

24. **C. meteoronotum**, sp. n. (tab. 367, fig. 18). C. mediocre, 1½-plo longius quam latius, profunde constrictum, sinu lineari; semicellulæ inæqualiter hexagonæ, marginibus superioribus lateralibus longioribus quam inferioribus, apicibus levissime convexis et

angustioribus quam bases, angulis lateralibus leviter submamillatis; a vertice visæ ellipticæ polis subacutis; a latere visæ ellipticæ; membrana delicate punctata. Long. 75 μ; lat. 50 μ; lat. isthm. 19·5 μ; crass. 26 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

This differs from *C. sexangulare* Lund. (in *Nova Acta R. Soc. Scient. Ups.* ser. 3, vol. 8, no. ii. 35, t. ii. f. 23) in its larger size, its relatively greater length, and in its unequal hexagonal semicells.

25. C. SULCATUM Nordst. *Alg. Sandvic.* 13, t. i. f. 18 (1878). Long. 33 μ; lat. 29 μ; lat. isthm. 8·5 μ; crass. 17·5 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

26. **C. mediogemmatum**, sp. n. (tab. 367, fig. 11). C. subparvum, 1¼-plo longius quam latius, profundissime constrictum, sinu aperto acutangulo; semicellulæ hexagono-ellipticæ, granulo prope sinum in margine inferiori utrobique, granulis magnis 6 circa granulum centralem in centro apicem versus, granulis duobus inferioribus subminoribus et cum scrobiculis perparvis 5 circa unumquemque; a vertice visæ ellipticæ polis subacutis, granulis 3 ad marginem et 2 intra marginem ad medium utrobique; a latere visæ globosæ, granulis tribus utrobique apicem versus et granulo in medio juxta isthmum; membrana delicate punctata. Long. 36–38 μ; lat. 29–31 μ; lat. isthm. 9·5 μ; crass. 20 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

The lateral angles of this species are usually finely granulate.

27. C. SINOSTEGOS Schaarschm, in *Magyar. Tudom. Akad. Math. Természett. Közlemén.* xviii. 266, tab, f. 12 (1883).

Var. OBTUSIUS Gutw. in *Sprawozd. Komisyi fizyographic., Akad. Umiej. w Krakowie*, xxviii. pt. ii. 129, t. ii. f. 13 (1893); West & G. S. West in *Trans. Linn. Soc.* ser. 2, v. 58, t. vi. f. 33 (1895). Long. 9·5 μ; lat. 10·5 μ; lat. isthm. 1·8 μ; crass. 6 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

28. C. EMARGINATUM West & G. S. West in *Trans. Linn. Soc.* ser. 2, v. 58, t. viii. f. 14 (1895). A large form with a narrower isthmus. Long. 17–18·5 μ; lat. 12–13·5 μ; lat. isthm. 4·8–5·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

29. C. MINIMUM West & G. S. West, *l. c.* 58, t. viii. f. 10 (1895). Long. 9·5–10·5 μ; lat. 8–9 μ; lat. isthm. 3–5 μ; crass. 4·5–5·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15. Morro de Lopollo; May 1860. No. 182.

30. C. EXIGUUM Arch. in *Proc. Dubl. Nat. Hist. Soc.* vol. iv. pt. i. 49–50, t. i. f. 32–33 (1864); Nordst. in *K. Sv. Vet.-Akad. Handl.* Bd. 22, no. 8, 58, t. vi. f. 12 (1888). Long. 19 μ; lat. 11·5 μ; lat. isthm. 6 μ; crass. 8·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

31. C. NORIMBERGENSE Reinsch in *Abhandl. Naturhistor. Gesellsch. Nürnberg*, Bd. 3, 113, t. ix. f. 2 (1866). *C. Hammeri* Reinsch, var. *octogibbosum* Reinsch, *l. c.* 112, t. x, f. 1. *C. octogibbosum* (Reinsch) W. B. Turn. in *K. Sv. Vet.-Akad. Handl.* Bd. 25, 52 (1892). *C. octogibbosum* var. *indica* W. B. Turn. *l. c.* t. viii. f. 8.

Forma ELONGATA. *C. exiguum* Arch. var. *norimbergense* Schmidle in *Flora*, lxxviii. 56, t. vii. f. 17 (1894). Forma subduplo longius quam latius. Long. 16–18 μ; lat. 9·5 μ; lat. isthm. 3 μ; crass. 7 μ (tab. 368, figs. 4, 5).

Huilla. In paludibus exsiccandis; April 1860. No. 176. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

Forma DEPRESSA. Long. 11 μ; lat. 11 μ; lat. isthm. 3·5 μ.

Loanda. In stagnis; Febr. 1858. No. 136.

32. C. MENEGHINII Bréb. in Ralfs, *Brit. Desm.* 96, t. xv. f. 6 (1848). Long. 12·5–13·5 μ; lat. 9·5–10 μ; lat. isthm. 3 μ; crass. 6 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

Small forms, but otherwise exactly agreeing with the figures in Ralfs (*l. c.*).

Var. ANGULOSUM (Bréb.) Rabenh. *Fl. Europ. Alg.* iii. 163 (1868). *C. angulosum* Bréb. in *Mem. Sciences Nat. Cherbourg*, iv. 127, 303, t. i. f. 17 (1856). Long. 11–12·5 μ; lat. 8·5–9·5 μ; lat. isthm. 3 μ; crass. 4·5–5·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

Pungo Andongo. Ad ramulos Podostemacearum in rivulis; March 1857. No. 105.

Var. SIMPLICIMUM Wille in *Vid.-Selsk. Forhandl. Christiania*, no. 11, 30, t. i. f. 11 (1880). Long. 13·5–20 μ; lat. 9·5–15 μ; lat. isthm. 1·5–4·5 μ; crass. usque 9 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

Pungo Andongo. Ad ramulos Podostemacearum in rivulis; March 1857. No. 105.

33. C. LÆVE Rabenh. *Fl. Europ. Alg.* iii. 161 (1868); Nordst. in *Öfv. K. Vet.-Akad. Förh.* no. 6, 29, t. xii. f. 4 (1876).

Var. MINIMUM, var. n. (tab. 368, fig. 6). Var. multe minor quam forma typica. Long. 11·5 μ; lat. 8·5 μ; lat. isthm. 2 μ; crass. 5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

34. C. SUBPYRIFORME Lagerh. in *Botan. Notiser*, 1887, 197, c. fig. A very small form with rather broader bases to the semicells than the type; other views not obtainable. Long. 23 μ; lat. sub. apic. 11 μ; lat. bas. semicell. 8·5 μ; lat. isthm. 2·7 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

35. C. AFFINE Racib. in *Rosprawy Akad. Umiej. Krakow. Wydzial. mat.-przyr.* ser. 2, t. ii. (vol. xxii.) 363, t. vi. f. 25 (1892).

Var. AFRICANUM, var. n. (tab. 368, fig. 7). Var. minor et angustior; membrana glabra. Long. 12·5–14 μ; lat. 9·5–10·5 μ; lat. isthm. 6·5–7·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

36. C. MINUTISSIMUM Arch. in *Q. J. M. S.* xvii. (new ser.) 194 et 301 (1877); Cooke, *Brit. Desm.* 91. The identification of this is somewhat uncertain, owing to Archer's meagre description; the following is a description of the plants seen:—

C. minutissimum, circiter 1¼-plo longius quam latius, profunde constrictum, sinu lineari extremo ampliato; semicellulæ elliptico-semicirculares; a vertice visæ ellipticæ; a latere visæ subglobosæ; membrana achroa et glabra. Long. 11 μ; lat. 8 μ; lat. isthm. 2 μ; crass. 5 μ.

Huilla. Morro de Lopollo; May 1860. No. 182.

37. **C. galeatum**, sp. n. (tab. 368, figs. 2, 3). C. parvum, subduplo longius quam latius, profunde constrictum, sinu lineari extremo valde ampliato; semicellulæ semiellipticæ, apicibus subtruncatis, angulis inferioribus leviter rotundatis, angulo unoquoque dentem parvum gerente; a vertice et a latere visæ ellipticæ; membrana glabra. Long. 20–22 μ; lat. 11·5–13 μ; lat. isthm. 3·5–4 μ; crass. 7·5 μ.

Huilla. Lopollo; Febr. 1860. No. 192.

The form of this species together with its small size and the presence of a tooth at each basal angle easily distinguish it.

38. **C. Libongense**, sp. n. (tab. 368, fig. 12). C. mediocre, circiter 1⅓-plo longius quam latius, profunde constrictum, sinu angusto-lineari, extremo subampliato; semicellulæ pyramidato-semicirculares, angulis inferioribus subrotundatis, lateribus 4 (vel 5)-crenatis, apicibus truncatis rectisque; a vertice visæ subangusto-ellipticæ; a latere visæ late ellipticæ; membrana dense punctata. Long. 46–49 μ; lat. 38–39 μ; lat. isthm. 12·5–14·5 μ; crass. 20 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

This differs from *C. subundulatum* Wille in its shorter cells, its truncate apices, its crenate lateral margins, its entire absence of granules, and in its different vertical and lateral views. From *C. subundulatum* var. *Beanlandii* West it differs in its crenate lateral margin, its more truncate apices, in the absence of granules, and in its different vertical view.

39. C. REPANDUM Nordst. in *Botan. Notiser*, 1887, 162; in *K. Sv. Vet.-Akad. Handl.* Bd. 22, no. 8, 58, t. vi. f. 14 (1888). A form with the semicells a little dilated upwards. Long. 56 μ; lat. 45 μ; lat. isthm. 21 μ; crass. 25 μ (tab. 368, fig. 13).

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

C. odontopleurum Arch. (in Roy et Biss. in *Ann. Scott. Nat. Hist.* (1894), 169, t. ii. f. 13) appears to be only a small form of *C. repandum* Nordst.

40. **C. multiordinatum**, sp. n. (tab. 367, fig. 8). C. mediocre, circiter $1\frac{1}{5}$–$1\frac{1}{6}$-plo longius quam latius, profunde constrictum, sinu angusto-lineari extremo subampliato; semicellulæ pyramido-trapeziformes, apicibus late truncatis, lateribus subrectis (leviter convexis), angulis leviter rotundatis; a vertice visæ ellipticæ in medio utrobique leviter et late tumidæ; a latere visæ globosæ; membrana uniformiter granulata, granulis in seriebus verticalibus (circ. 8) et obliquis, scrobiculis parvis 6 circa granulum unumquemque in forma hexagona ordinatis, cum lateribus oppositis duobus formæ hexagonæ horizontalibus. Long. 61·5–73 μ; lat. 51–62 μ; lat. apic. 25–33 μ; lat. isthm. 14·5–21 μ; crass. 35 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

This is nearest to *C. decoratum* West & G. S. West (in *Trans. Linn. Soc.* 2nd ser. v. 61, t. vii. f. 21), but it is easily distinguished by its shorter cells, its smaller size, its round (not triangular) scrobiculations surrounding the granules, as well as its wider apex.

This is the only species we know which has the two opposite sides of the hexagons of scrobiculations surrounding each granule, horizontally disposed.

41. C. MARGARITATUM (Lund.) Roy & Biss. in *Journ. Bot.* xxiv. 194 (1886); Roy in *Ann. Scott. Nat. Hist.* 167, t. ii. f. 12 (1894). *C. latum* Bréb. var. *margaritatum* Lund. in *Nova Acta R. Soc. Scient. Ups.* ser. 3, viii. 26 (1871).

Forma MINOR Boldt. in *Bih. till Sv. Vet-Akad. Handl.* Bd. 13, Afd. 3, no. 5, 26 (1888). Long. 44–60 μ; lat. 38–47 μ; lat. isthm. 12·5–13·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

42. C. PORTIANUM Arch. in *Q. J. M. S.* viii. 235–6, t. xi. f. 8, 9 (1860); in Pritch. *Infus.* 733 (1861); Rabenh. *Fl. Europ. Alg.* iii. 160 (1868).

Var. ORTHOSTICHUM Schmidle in *Bericht. Deutsch. Bot. Ges.* Bd. xi. Heft. 10, 549, t. xxviii. f. 7 (1893). Forma minor, semicellulis exacte ellipticis (ut in forma typica), granulis in seriebus verticalibus distinctis 9 (circ.) ordinatis. Long. 25 μ; lat. 19 μ; lat. isthm. 8·5 μ; crass. 12·5 μ (tab. 368, fig. 9).

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

This approaches *C. nephroideum* Roy & Biss. (in *Ann. Scott. Nat. Hist.* 1894, 169, t. ii. f. 3), which seems to differ from *C. Portianum* var. *nephroideum* Wittr. both in its smaller size and in the regular arrangement of its granules.

43. C. TRACHYCYRTUM Reinsch, *Contrib. Alg. et Fung.* 83, t. xviii. f. 1 (1875). Forma lateribus minus retusis. Long. 15 μ; lat. 14·5 μ; lat. isthm. 4·5 μ; crass. 7·5 μ.

Huilla. Inter *Porphyrosiphonem Notarisii* Kütz. in udis sylvaticis et apricis inter Monino et lac. Ivantala; April 1860. No. 14.

44. C. PUNCTULATUM Bréb. in *Mém. Soc. Sciences Nat. Cherbourg*, iv. 129, 303, t. i. f. 16 (1856); Klebs in *Schrift. phys.-ökon. Gesellsch. Königsberg*, xx. 37, t. iii. f. 50, 51 (1879). Lat. = long. = 18 μ; lat. isthm. 6 μ; crass. 9 μ.

Huilla. In rivulis prope Lopollo; May 1860. No. 187.

Var. ELONGATUM Klebs, *l. c.* t. iii. f. 53. Long. 34·5–38 μ; lat. 23–25 μ; lat. isthm. 11·5–12·5 μ; crass. 18·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

45. C. CONCENTRICUM W. B. Turn. in *K. Sv. Vet.-Akad. Handl.* Bd. 25, no. 5, 62, t. ix. f. 11 (1893).

Var. RADIATUM, var. n. (tab. 368, fig. 10). Var. multe minor, granulis minutis radiatim et concentrice ordinatis. Long. 13·5–15 μ; lat. 11·5–13·5 μ; lat. isthm. 3–3·5 μ; crass. 7·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

46. C. BLYTTII Wille in *Vid.-Selsk. Forhandl. Christiania*, no. 11, 25, t. i. f. 7 (1880). Long. 15 μ; lat. 12 μ; lat. isthm. 4 μ; crass. 8 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

47. C. SUBCOSTATUM Nordst. in *Ofv. K. Vet.-Akad. Forh.* no. 6, 37–8, t. xii. f. 13 (1876).

Forma MINOR West & G. S. West in *Journ. Bot.* xxxiv. 379, t. 361, f. 15 (1896). Long. 19 μ; lat. 18·5 μ; lat. isthm. 5·5 μ; crass. 10·5 μ.

Mossâmedes. Inter Charas in rivo Caroca pr. Cabo negro; Sept. 1859. No. 19.

48. C. ALATUM Kirchn. in Cohn, *Kryptogamen-flora von Schlesien*, Zweit. Bd., 153 (1878). Long. 23–24 μ; lat. 19–21 μ; lat. isthm. 6·5 μ; crass. 10·5 μ.

Loanda. In stagnis; Febr. 1858. No. 136.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

Var. SUBOBLONGUM var. n. Var. semicellulis angustioribus, angulis basalibus rectangularibus, crenis basalibus tricrenulatis. Long. 21 μ; lat. 17 μ; lat. isthm. 5·5 μ; crass. 9·5 μ.

Pungo Andongo. Ad ramulos Podostemacearum in rivulis; March 1857. No. 105.

49. **C. subtriordinatum**, sp. n. (tab. 368, fig. 11). C. parvum, tam longum quam latum, profunde constrictum, sinu lineari extrorsum aperto; semicellulæ transverse oblongo-ellipticæ, lateribus rotundatis cum granulis minimis 9, apicibus rectis glabrisque, intra marginem lateralem unumquemque granulis subordinatis instructæ, in centro seriebus tribus verrucarum quadratarum trausverse ordinatis (3 in seriebus inferioribus, 2 in serie superiori); a vertice visæ ellipticæ, ad medium utrobique verrucis tribus instructæ, polis minute granulatis; a latere visæ depresso-globosæ, lateribus tricrenatis, apicibus glabris, intra margines granulis subordinatis instructæ. Long. 26 μ; lat. 25·5 μ; lat. isthm. 9·5 μ; crass. 17 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

The nearest species to this is *C. triordinatum* West and G. S. West (in *Trans. Linn. Soc.* ser. 2, v. 66, t. vii. f. 27), from which it differs in its less wide cells, its rounded and not acute granules, its smooth apex, and in its quadrate (not rounded) and fewer central warts.

(To be continued.)

NOTES ON BRISTOL PLANTS.

By James W. White, F.L.S., and David Fry.

The following notes of plants observed since 1892, in the area of the Bristol Coal-field (W. Gloucester and N. Somerset), are in continuation of those which appeared in this Journal for 1893, pp. 115–117. Species and varieties not yet recorded (so far as we are aware) for vice-counties 6 or 34 are distinguished by an asterisk before the name; whilst G and S, after the localities, refer to vice-counties 34 and 6 respectively.

**Fumaria densiflora* DC. Cultivated ground, Wells, S. New to Somerset.

Nasturtium palustre DC. Bank of River Chew at Compton Dando, S.

**Viola Riviniana* Reichb. var. f. *villosa* (Neum., W. & M.) (*fide* Mr. Beeby). Near Shipham, and in woods at Weston-super-Mare, S. New to Somerset.

**Cerastium arvense* L. Hillside at Loxton, S. New to Somerset.

Sagina ciliata Fr. Brandon Hill and Mangotsfield, G. Brislington, S.

**Hypericum Elodes* L. Mangotsfield Common, G. New county record. It is remarkable that this widely distributed species has not been recorded previously for any locality in the county of Gloucester.

Melilotus indica All. Plentiful in cultivated ground at Corston, S. This appeared for several years in succession after it was first observed.

Vicia angustifolia L. var. b. *Bobartii* Koch. Plentifully at Conham, G.

Rubus fissus Lindl. Abundantly in the Lords Wood, Houndstreet, S. This bramble, which the Rev. W. Moyle Rogers regards as essentially *fissus*, has a remarkably different aspect from the typical form, owing to its extremely luxuriant habit, the stems being often six feet or even more in height, and the leaves frequently very large—many of them septennate—with leaflets of a thinner texture than usual, the terminal one recalling in shape that of *R. suberectus*. The stem-prickles, though numerous, are fewer and less crowded, and have much more dilated bases than in *fissus*, growing at a considerable elevation, which we have gathered in the Midlands.—**R. sulcatus* Vest. Wood near the River Chew at Compton Dando, and in the Lords Wood, Houndstreet, S. These two stations are the only ones recorded, so far, for this bramble in the county of Somerset.— *R. plicatus* W. & N. Near Wyck Rocks, G.; only two bushes, but very fine and characteristic. — **R. nitidus* W. & N. Very plentifully in the Lords Wood, Houndstreet, S. Mr. Rogers considers this thoroughly good *nitidus;* but the stamens are remarkably short, and in general habit it seems to differ from the southern type very much as the *fissus*, growing in the same wood, does from the usual form of that species. New to Somerset.—*R. dumnoniensis* Bab. Tate Common and Danory Bridge, G.—*R. rhombifolius* Weihe.

Very sparingly on Downhead Common, S. — *R. pyramidalis* Kalt. Near Wyck Rocks, G. Clevedon, Compton Dando, and Houndstreet, S. — **R. rudis* W. & N. Dr. Fox's Wood, Brislington, S. The only locality as yet recorded for this bramble in Somerset.—*R. adornatus* P. J. Muell. By the Avon, near Sneyd Park, G. Hybrid Rubi :—**R. rhamnifolius* × *Lindleianus*. Clifton Down, G. — *R. leucostachys* × *rusticanus*. Near Wyck Rocks, G. Leigh Woods, S. — **R. rudis* × *Lindleianus*. Dr. Fox's Wood, Brislington, S. — *R. corylifolius* × *rusticanus*. Near Wyck Rocks, G. Congresbury, S.—**R. cæsius* × *corylifolius*. Near Stanton Prior, S.

Potentilla procumbens Sibth. Near Compton Dando, S. — **P. procumbens* × *silvestris* (*fide* Mr. A. Bennett and Rev. E. S. Marshall). Damory Bridge, G. Near Edington, S. — *P. argentea* L. Near Falfield, G. The locality where this species occurs, an elevation of the trap rock—a very rare formation in the district—is the only one known to us in the Bristol Coal-field at which it can be regarded as truly native.

Rosa obtusifolia Desv. var. b. *frondosa* Baker. Hedge on the Locking Road, Weston-super-Mare, S.; one bush only seen.

Sedum rupestre L. var. b. *minus* Syme. Worle Hill, S.

Hybrid Epilobia :—**Epilobium hirsutum* × *montanum*. A garden weed at Corston, S. — **E. montanum* × *obscurum*. Brislington, S. —**E. Lamyi* × *lanceolatum*. Brislington, S. — **E. Lamyi* × *montanum*. A garden weed at Corston, S.

Eryngium campestre L. In N. Somerset. Some doubt having been recently expressed as to whether this still exists at Weston-super-Mare, it may be worth stating that we saw the plant in considerable abundance there in July, 1896; certainly not at the spot where it was first discovered, in 1843, by the late Mr. G. S. Gibson, of Saffron Walden, Essex (judging from his note in *Phytol.* 1st ser. i. 757), but in another locality on the hill above the town.

Œnanthe pimpinelloides L. Pastures at Compton Dando, S. Though this occurs at several places in N. Somerset, it has not previously been found near Bristol. — *Œ. fluviatilis* Coleman. Abundantly in the canal between Midford and Combehay, S. Not recorded elsewhere for the Bristol Coal-field.

Crepis biennis L. Abundantly in a field at Weston-super-Mare, S.

Hieracium vulgatum Fr. var. *maculatum* (Sm.). Plentifully on colliery refuse at Camerton, S. — *H. rigidum* Hartm. var. b. *pullatum* Dahlst. Sparingly at Ebbor Rocks, near Wells, S. The Rev. R. P. Murray, in his *Flora of Somerset*, records *H. gothicum* Fr. for Ebbor, on the authority of specimens which were gathered by the late Prof. Babington in 1851, and are now in Mr. F. J. Hanbury's herbarium. The name "*gothicum*" for this plant has, however, for some time past been regarded as doubtful; but Babington's specimens are in very bad condition, and insufficient for satisfactory determination. We were therefore glad to be able to send Mr. Hanbury specimens gathered at Ebbor last July, which we supposed represented Babington's plant. These he considers belong to *H. rigidum* var. b. *pullatum*; an opinion in which the Rev. E. S. Marshall concurs.

Vaccinium Oxycoccos L. Sparingly on Blackdown (Mendip), S. Observed by Mr. W. F. Miller, and recorded in this Journal for 1896, p. 319. We are informed by Mr. T. Compton, of Winscombe, that he and the late Mr. Hallam, of Axbridge, found *V. Oxycoccos* on Blackdown in Aug. 1860; but since then it appears to have been lost sight of at that locality until Mr. Miller rediscovered it in May last.

Statice auriculæfolia Vahl. var. b. *intermedia* Syme. Birnbeck Island, Weston-super-Mare, S.

Cuscuta Epithymum Murr. Railway embankment, Newton St. Loe, S. Growing on various species of *Compositæ* and *Umbelliferæ*.

Linaria repens Mill. Growing between the metals on the G.W.R., Saltford, S. Undoubtedly an introduction, but thoroughly established, and constant for many years past.

Euphrasia paludosa Towns. (*fide* Mr. A. Bennett). Peat Moor, near Edington, S.

Chenopodium opulifolium Schrad. Bitton; Clifton and Fishponds, G. Bath and Corston, S. This alien is usually confined to dust-heaps, being occasionally plentiful and constant.—*C. ficifolium* Sm. Many plants on rubbish near Bath, S. Perhaps the same as recorded by Mr. S. T. Dunn in this Journal for Nov. 1896.

Sparganium ramosum Huds. var. b. *microcarpum* Neum. (*fide* Rev. E. F. Linton). Keynsham and Weston-in-Gordano, S.

Eleocharis acicularis R. Br. Abundantly in many places by the edge of the canal between Bath and Cleverton, S. We believe that this does not flower excepting when occasionally it becomes exposed owing to the water receding from the mud.

Scirpus pauciflorus Lightf. Blackdown (Mendip), S.—*S. fluitans* L. Blackdown (Mendip); also very abundantly in ditches in the moor at Weston-in-Gordano, S.—*S. Holoschœnus* L. Berrow, S.

Carex acuta L. Bank of Avon at Hanham, G. Compton Dando and Saltford, S.— *C. pallescens* L. Woods at Compton Dando and Marksbury, S. — *C. strigosa* Huds. Woods at Compton Dando, Houndstreet, and Marksbury, S.

Lycopodium clavatum L. Blackdown (Mendip), S. Detected by Miss Gregory. We believe that the only other locality in N. Somerset from which this has been recorded is a hill near Clevedon, where it has been known for a very long period.

Of the plants above recorded, the following—many of them of great interest—were discovered by Mrs. E. S. Gregory, Fairleigh, Weston-super-Mare:—*Viola villosa*, *Cerastium arvense*, *Rosa frondosa*, *Crepis biennis*, *Statice intermedia*, and *Scirpus Holoschœnus* The discovery of *S. Holoschœnus* in Oct. 1896, at Berrow, on the shore of the Bristol Channel, is the most important addition which has been made to the flora of N. Somerset during a very long period; and all the more remarkable because the ground where the *Scirpus* occurs has been diligently worked over for fully a century past by local and other botanists. Whilst it can hardly be doubted that *S. Holoschœnus* grew formerly at Watchet, in S. Somerset, it is equally certain that the plant has not been seen there recently; and it therefore seems likely that Mrs. Gregory's discovery has restored to the flora of the county a very interesting species, long supposed to have been lost.

With reference to *Viola villosa* and *Scirpus Holoschœnus*, Mrs. Gregory has sent us the following notes:—"*V. villosa*. This occurs on hillocks beyond Winterhead Avenue, near Shipham, growing with the type, from which it differs not only in hairiness of stem and leaves, but in colour of petals (a bright pink), and in the smaller and darker spur and toothed bracts. The same form grows on high ground in the woods at Weston-super-Mare."

"*S. Holoschœnus*. On Oct. 1st, 1896, I chanced on this rare plant in a marsh near Berrow, having gone in search of *Scirpus uniglumis*, of which I imagined I had seen specimens on a former visit. The afternoon was wet and windy, and early twilight soon cut short my search. Disappointed at having found nothing, I hastily gathered a handful of the plants nearest to me, and on looking them through a day or two later I discovered my treasure. Mr. Beeby and Mr. A. Bennett have kindly examined my specimens, and confirmed the name. The Berrow plant is very small and depauperate, and remarkably different from the *Scirpus* as it grows at Braunton Burrows, N. Devon."

We have to thank Mr. Cedric Bucknall, of Clifton, for notes of *Fumaria densiflora*, *Scirpus pauciflorus*, and *S. fluitans*; and we are indebted to Mr. C. Withers, of Saltford, for pointing out to us the habitats of *Hypericum Elodes*, *Cuscuta Epithymum*, and *Linaria repens*.

NOTES ON PENTAS.

By James Britten, F.L.S.

A "revision" of a genus which contains no generic description, no key to the arrangement of the species, no diagnoses of any save the new species, and an incomplete synonymy, is not likely to add much to scientific knowledge. When in addition the reviser announces that he has "examined all the species carefully as a guide to their African distribution," the reason for the examination is only less odd than his omission to place on record the results of his investigations. All these characteristics are to be found in the "Revision of the Genus *Pentas*" by Mr. G. F. Scott Elliot, which is printed in the *Journal of the Linnean Society*, vol. xxxii. pp. 431–438 (1896).

As Mr. Elliot has told us nothing about the genus he purports to have revised, it is not wonderful that he should have omitted any reference to its synonymy. I am inclined to think that Brown's *Neurocarpæa*, published in Salt's *Abyssinia* (Appendix iv, p. lxiv, (1814)), will have to supersede *Pentas*. True, Brown gives no description; but he cites as a synonym *Manettia lanceolata* Vahl. (*Symbolæ*, p. 12 (1790)), which is based on *Ophiorhiza lanceolata* Forsk. (*Fl. Ægypt. Arab.* p. 42 (1775)). Of this last we have a specimen from Forskahl in the British Museum, and Brown's

Neurocarpæa lanceolata (from Salt) is on the same sheet. There can therefore be no question as to what Brown meant; and Mr. Hiern tells me he intends to restore *Neurocarpæa* in his Catalogue of the Welwitsch plants. I do not, however, propose, after the manner of some German and American botanists, to publish under the restored name a list of the species which should be transferred to it; but I think it may be worth while to print the notes I have made while endeavouring to arrange the British Museum specimens in accordance with Mr. Elliot's revision.

The "table of species" which precedes the detailed enumeration contains no diagnostic characters as a guide to arrangement, and is apparently based on geographical distribution. Whatever value might attach to this method is effectually neutralized by Mr. Elliot's want of acquaintance with the plants enumerated. As I shall show, his first species from "Central Watershed" is identical with his ninth, from "Masai and Shire Highlands"; his fifth from "Comoros and Arabia" is synonymous with his tenth, "General (not Western)." By this geographical arrangement, moreover, allied plants are widely separated: thus we are told that species 23 is "allied to" No. 10, and that species 24 is "nearly allied" to No. 16.

Mr. Elliot's first species is "P. VERTICILLATA K. Schum. ined. MSS. in Herb. Kew.," for which he cites Fischer No. 319 and Elliot No. 8045. The first only is the type—*i.e.* the plant so named by the author of the supposed species. This is a fragmentary specimen consisting of the upper part of a stem with a head of flowers and a few leaves; Elliot No. 8045, identified with it by the reviser, is a still smaller scrap. Both at once recall *P. longiflora* Oliv.; and Dr. Schumann informs me that Fischer No. 319 in the Berlin Herbarium, whence the Kew specimen was sent, certainly belongs to that species, and that he has no intention of publishing that plant as new. It is difficult to understand why Mr. Elliot did not consult Dr. Schumann before casting upon the world an entirely new name, without a word of description.

Placed with these fragments at Kew is a handsome plant collected at Kambole, Tanganyika, in 1896, by Mr. W. H. Nutt; if this belongs to the genus, it is a very distinct and striking species.

The fact that two other species of *Neurocarpæa* have been sent out from Berlin bearing MS. names seems to render necessary some protest against the circulation of such names, especially when these are merely temporary, and subsequently abandoned by their authors. One of these species is cited by Mr. Elliot as "*P. volubilis* K. Schum. MSS.," with an odd note—"no description appended to the specimen" —as though such appendage were an ordinary practice. This has since been published by Dr. Schumann in *Engl. Bot. Jahrb.* xxiii. 421 (Nov. 24, 1896). The other, sent from Berlin both to the British Museum and Kew, Dr. Schumann has no intention of publishing, having since identified the plant—Preuss No. 664, a number not cited by Mr. Elliot—with *N.* (*P.*) *occidentalis*. The practice of circulating MS. names is not a new one—we have in Pallas's herbarium plants bearing the MS. names under which they were sent from the Banksian Herbarium, such names being still unpublished: and it is not always easy of prevention. Such instances as those under notice are, of course, preventible enough: no plants should be distributed with MS. names unless their publication is imminent, and even then the practice is of doubtful expediency. But if a collector is naming his plants from a herbarium, he can hardly be blamed if he assumes that the names he finds therein have been duly published; and in all probability he will distribute specimens bearing these names, as was done by Mr. Elliot in the case of his Sierra Leone collections. The mischief does not end here. The collector's identification may be, and often is, hasty; and it may well happen that the plant he distributes as *x* of Jones, may prove to be *y* of Smith, or *z* of some future monographer. The name *x* may in this way have been disposed of before its author has put it into circulation, and may have been identified with another species to which the true *x* bears only a superficial resemblance.

This presents one aspect of the inconveniences which have been caused by the long delay which has taken place in the continuation of the Tropical African and Cape Floras. Some orders were monographed for the latter of these works as much as twenty years ago; while a very large number of specimens at Kew and elsewhere are named in accordance with descriptions which have not yet seen the light, and are, so far as we can judge, in no immediate likelihood of doing so. But workers at Kew—Mr. Elliot himself, for example—have matched their plants with these unpublished species, and have then distributed them with the MS. names borne by the latter. In this way a certain proportion of these *nomina nuda* have found their way into circulation; but the plants bearing them may at any moment be published by other workers under different names,* which of course will take precedence over the MS. nomenclature.

I have the less hesitation in speaking strongly on this subject, because I myself fall to some extent under the criticism I am offering. In 1893, when working at Whyte's Mlanji plants, Mr. Baker, with characteristic generosity, allowed me access to his unpublished monograph of the African species of *Plectranthus*. Among Whyte's specimens was a plant clearly identical with one of Mr. Baker's novelties; and as at that time one of the many statements as to the imminence of a continuation of the Tropical African Flora was in circulation, I entered the plant on my list as "*P. manganyensis* Baker in Oliver, *Fl. Trop. Afr.* iv. ined.," and it so appears in *Trans. Linn. Soc.* ser. 2, iv. 37 (1894). Ordinary courtesy demanded no less; but, should some other botanists describe the same plant under another name, I imagine that Mr. Baker's *nomen nudum* will not stand.

Mr. Elliot's fifth species, "P. LANCEOLATA K. Schum. MSS.," appears to afford another instance of a previously unpublished name, but it is rather an example of carelessness of citation and imperfect understanding of synonymy. The name should certainly not be cited from any "MSS.," for it occurs on the very page of

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* See *Journ. Bot.* 1894, 84–86, for examples of this.

Engler's *Pflanzenwelt Ost-Afrikas* cited by Mr. Elliot a few lines above for *P. longituba*, where it stands—"*P. lanceolata* (Forsk.) K. Sch. in Engl.-Pr. iv. 4, S. 29." Mr. Elliot does not seem to have looked up this reference—had he done so, he would have found there a species omitted from his list, and would further have discovered that *P. lanceolata* is identical with *P. carnea* Benth. (which stands tenth on Mr. Elliot's list), Dr. Schumann having, in accordance with the practice at Berlin, restored the oldest specific name.

Mr. Elliot's treatment of P. CARNEA next demands attention: but I propose first to tabulate the synonymy of the species, which is somewhat extensive, and in one instance confused. This plant is the type of Brown's *Neurocarpæa* as well as of Bentham's *Pentas*, so that, whichever name be ultimately adopted, the earliest representative of the genus is identical in each case. I have arranged the synonyms in chronological order.

NEUROCARPÆA LANCEOLATA Br. in Salt, Abyss. Appendix iv. p. lxiv (1814).
Ophiorhiza lanceolata Forsk. Fl. Ægypt. Arab. p, 42 (1775).
Manettia lanceolata Vahl, Symbolæ, p. 12 (1790).
?Mussænda ægyptiaca Lam. Encycl. iv. 394 (1795–6).*
Sipanea carnea Neumann in Rev. Hort. 2 S. ii. 445 (1843).
Pentas carnea Benth. ex Hook. Bot. Mag. t. 4086 (1844).
Orthostemma roseum Wall. ex Voigt, Hort. Calcutt. 384 (1845).
Vignaldia Quartiniana A. Rich. Tent. Fl. Abyss. i. 357 (1847).
Mussænda luteola Hochst. ex A. Rich. l. c., non Delile.
Pentanisia suffruticosa }
Pentanisia nervosa } Klotzsch in Peters, Mossambique (Bot.) i. 287–8 (1862).
Pentanisia cymosa }
Pentas Quartiniana Oliv. in Trans. Linn. Soc. xxix. 82 (1873).
Pentas Klotzschii Vatke in Linnæa, xxv. 232 (1875).
Pentas rosea Lanessan in Compte-rendu Assoc. Française, Sess. 5, p. 473 (1877).
Virecta carnea Baill. Hist. Pl. vii. 331 (1879).
Pentas lanceolata K. Sch. in Engl. & Prantl, iv. pt. 4, p. 29 (1891).

Mr. Elliot divides this species into five varieties, which he introduces with a characteristically vague note: "The following varieties might almost be considered specifically distinct; indeed German botanists seem from MSS. notes to uphold var. c and var. d as distinct species." Seeing that Klotzsch published a description of var. d under three names, and that Vatke (uniting them into one) also printed his description, it is not easy to say why Mr. Elliot should refer to "MSS. notes" in evidence of German opinion. Here, as throughout his "revision," Mr. Elliot gives no synonymy. It may therefore be convenient to say that, so far as these varieties go (I confess I have formed no high estimate of their value), the synonyms in the above list divide among them as follows:—

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* Mr. Jackson cites this as of "Poir. in Lam. Encyc.": but Poiret's work begins with vol. v. of that work.

a. *hortensis* includes P. carnea, P. rosea, Sipanea carnea, Virecta carnea, Orthostemma roseum.

c. *Quartiniana* includes Neurocarpæa (Pentas) lanceolata (Ophiorhiza l., Manettia l.), Vignaldia Quartiniana, Mussænda luteola Hochst. non Del., Pentas Quartiniana.

d. *Klotzschii* = Pentas Klotzschii (Pentanisia 3 spp.).

The two remaining varieties, c. *comorensis* and e. *Welwitschii*, appear to be new; the latter is a *nomen nudum*, no word of description being added to differentiate it from its four allies.

The confusion in synonymy which finds place in the *Index Kewensis* originated with *Mussænda luteola* Delile (Cent. Pl. Meröe, 65 (1826). Delile cites the first three of the above synonyms as belonging to his plant, but the latter possesses the characteristic foliaceous calyx-segment of *Mussænda*, and, as his figure shows, differs in other respects from Forskahl's type, although it is not excluded by the very brief diagnosis. Mr. Jackson rightly retains *M. luteola* Delile as a species and relegates *M. luteola* Hochst. to *Pentas carnea* Benth.; but he follows Delile in referring to *M. luteola* *Ophiorhiza lanceolata* Forsk., and *Manettia lanceolata* Vahl, which are really synonymous with *P. carnea*. *Mussænda ægyptiaca* Lam. stands in a different position; Lamarck cites Forskahl's and Vahl's names as synonyms, but places *M. ægyptiaca* in the section "Calices appendiculés"; his description, however, contains no reference to the large foliaceous calyx-segment which is so conspicuous in *M. luteola*, so that it is not easy to be certain where *M. ægyptiaca* should be placed. *Sipanea carnea*, kept up by Jackson, is certainly *P. carnea*.

It may be well to point out that certain synonyms which find place in the *Index Kewensis* are hardly entitled even to that position.

"*elatior*, Benth. in Hook. Niger Fl. 402 in obs.; et Walp. Rep. vi. 57 = Virecta procumbens?"

Bentham's note in *Niger Flora*, p. 401, runs: "*V. elatior*, DC., from Angola, is unknown to me, and may possibly be a *Pentas*." This hardly affords ground for the definite citation of "P. elatior Benth."

"*pentandra* Benth. [l.c.] = Oldenlandia macrophylla."

Bentham's note runs: "*Hedyotis pentandra* Schum. & Thonn. [has] been referred to the same genus [*Pentas*], though with some doubt."

P. Quartiniana is rightly cited by Mr. Jackson as of "Oliv.," although Prof. Oliver, in Trans. Linn. Soc. xxix. 82, gives it as of "Hook. fil. in Benth. & Hook. fil. Gen. Pl. ii. 54." Sir Joseph Hooker is not specified in the work cited as the author of the *Rubiaceæ;* moreover, the name *Quartiniana* is not even mentioned, although the genus *Vignaldia* A. Rich., of which it formed part, is placed under *Pentas*.

Mr. Elliot's treatment of P. PURPUREA is remarkable. He rightly cites it as of "Oliv. in Trans. Linn. Soc. xxix. (1873) 83," and proceeds to divide it into three varieties: *a. typica*, b. *Buchanani*, and "c.?" Of a. and b. he gives short diagnoses; of c. not a word of description. Under this last, however, he places Johnston's

Kilimanjaro plant, which was identified by the author of the species with the original *P. purpurea* founded on Grant's plant (which Mr. Elliot assigns to "Speke")—*i. e.* with Mr. Elliot's "var. a. *typica*." There may, of course, be reasons for differentiating the two plants; but Mr. Elliot does not give them. It is to be regretted that he does not make it clear which of the "Speke" (*i. e.* Grant) specimens cited is the type of the species; the Zanzibar plant which stands first in the enumeration was not included by Prof. Oliver in his *purpurea*, but was doubtfully referred by him to *P. carnea;* the type of *purpurea* was the Usni plant.

With regard to Mr. Elliot's new species, it is unfortunate that he gives no indication of their affinities. One would like to know, for example, how *P. Thomsonii* contrasts with *P. Schimperiana*, to which the specimens in the Kew Herbarium were originally referred.

It remains to be said that Mr. Elliot has exhausted neither the specimens nor the literature which lay ready to his hand. Several plants in the British Museum Herbarium, named by him in MS., find no place in the revision. In his prefatory note, Mr. Elliot says: "Great difficulty has arisen from the new species which have been described in the interval betwixt writing and reading this paper," but difficulties of this kind are incident to every monographer. Yet as the paper was not published until Nov. 1896, it would seem that *P. modesta* Baker, published in December, 1895, in the *Bull. Misc. Inform.* for November of that year might have been added; and it is impossible to account for the absence of *P. Warburgiana* K. Sch., cited in Engl. & Prantl, Pflanzenfamil. iv. 4, 29 (1891).

At the end of the revision Mr. Elliot deals with the "excluded species" in a somewhat eccentric manner. He quotes "*P. speciosa* Baker," without any reference to its place of publication, and adds: "This is a new species of *Otomeria* closely allied to *O. dilatata;* this latter genus should, I think, be included in *Pentas*, but it is distinctly not advisable to make alterations in the genera unless the entire order is monographed." This, it may be hoped, is to be regarded rather as a counsel of perfection than as a rule of life, and clearly Mr. Elliot does not practise what he preaches, otherwise we should have been spared this "revision." But will it be believed that after this expression of opinion as to the identity of *Otomeria* with *Pentas*, and these lofty sentiments as to "alterations in genera," Mr. Elliot proceeds to coin a new name for *P. speciosa*, which he styles "Otomeria speciosa Elliot"! He further darkens counsel by saying "the original *Otomeria dilatata* Hiern contains the following plants"; most of those he enumerates had not even been collected at the time when "the original *O. dilatata*" was published! Even in transcription, both of references and localities, carelessness is observable—*e.g.* "203 miles south of Niamkolia" should read "20 miles south of Niomkoto."

Mr. Elliot omits from the excluded species *P. Thonningii* Wlprs. MSS. (= *Hedyotis pentandra* Schum. & Thonn.), as well as other exclusions given by Jackson, to which I have already referred.

Mr. Elliot says he "found this genus in a very unsatisfactory state of confusion." I do not myself see that "confusion" can be otherwise than "unsatisfactory"; but I think those who work at the genus, or who read the above comments upon his "revision," will agree with me that Mr. Elliot has done little to extricate *Pentas* from its undesirable condition. Rather has he added with no sparing hand new elements of chaos, some few of which I have here tried to reduce.

The responsibility for publishing the paper, however, rests with the Council of the Linnean Society. The publications of this, as of all learned bodies, are necessarily unequal in value; but it is always supposed that a certain standard of excellence is demanded, higher, at any rate, than that which would be exacted by the editor of a scientific periodical. Yet it is not easy to believe that a "revision" marked by the defects which I have mentioned in my opening sentence would have been passed for publication in any botanical journal; and it is astonishing—a stronger word might be applied with perfect accuracy—that such a paper as this should find a place among the publications of a body of the standing of the Linnean Society.

HENRY BOSWELL.

The death of Mr. Henry Boswell, at Oxford, on February 4th, deprived us of one of our most competent bryologists. He was born at Oxford, of an old city family: the date of his birth, according to information obtained from his sister, being Jan. 27th, 1837. He was very precocious, and at the age of two was able to read. From his boyish days he was fond of flowers. At the age of twenty-five he succeeded, on the death of his father, to the old-established business of portmanteau-maker in the Corn Market, which he carried on till the end of 1895. His chief botanical field-work was done in the fifties, at which time he became well acquainted with the botany of the district.

The first published note by him with which I am acquainted is one on "Additions to the Flora Oxoniensis," which appeared on pp. 99–101 of the *Phytologist* for 1860, in which several plants additional to the counties of Oxfordshire and Berkshire are mentioned; also an excellent paper on "Oxfordshire Mosses" appeared in the same volume, in which about 120 species are enumerated; additions to this are given in vol. v. of the same Journal.

Boswell contributed many valuable papers to the *Journal of Botany;* the first of these appeared in 1872, entitled "The Mosses of Oxfordshire and the Neighbourhood of Oxford." His contributions were mainly restricted to information regarding British Mosses, but in 1887 he contributed an interesting list of 191 species of Jamaica Mosses and Hepaticæ, thirty-eight being new to the island, and one, *Scapania grandis*, before unknown. In 1892, on p. 97, he contributed a valuable paper on "New Exotic Mosses," in which eight new species are described. In 1890 he wrote a memoir of his old friend and correspondent Dr. J. Bland Wood, of Manchester, whose death he deeply felt. In his last paper, which appeared in 1894, he gave an account of "Some New Zealand Mosses and Hepaticæ," in which the doubtful genus *Helmsia* is established.

To the *Naturalist* of 1879, p. 33, Mr. Boswell contributed a paper on Mosses; in the same year he compiled, for the Botanical Record Club, the *London Catalogue of British Mosses and Hepatics*, of which a second edition appeared in 1881; he also acted for several years as the Moss referee for the same club. The valuable account of the Mosses and Hepatics in my *Flora of Oxfordshire* was written by Mr. Boswell. His work at the flowering plants and ferns of the neighbourhood of Oxford was chiefly done between the years 1856–76; and he was the first to record several species for Oxfordshire.

He contributed a list of plants, chiefly from the north of Berkshire, to Mr. Britten's "Contributions to a Flora of Berkshire" which appeared in the *Journal of the Newbury Field Club* in 1871.

In conjunction with Prof. Lawson and Mr. H. E. Garnsey, Mr. Boswell worked with much assiduity at the Moss Herbarium at the Botanical Gardens. During the interregnum which ensued on Prof. Lawson's retirement from the botanical chair at Oxford, Mr. Boswell rendered great assistance to the curators, which was acknowledged by the acting curator, Mr. E. Chapman, in his

"Report for 1883," in which he says: "Our best thanks are due to Mr. Boswell, who, as an acknowledged authority all over Europe, has freely given us a large portion of his time and skill in naming and arranging the large collection of Mosses. One instance of his work will suffice, *viz.* the identification and arrangement of a large cabinet of mosses sent to us by the University of Dublin for this purpose; this work he has now completed." The Mosses and Hepatics in the herbarium at the Botanical Gardens at Oxford were arranged by Mr. Boswell with the accuracy and neatness characteristic of him.

In 1881 Mr. Boswell received the high distinction of being made a Master of Arts, *honoris causa*, by the University of Oxford. Mr. Boswell was one of the few citizens, actually in business in the city, to whom such a degree has been granted.

I made Mr. Boswell's acquaintance in 1880, shortly after I took up my residence in Oxford. Even at this time field-work had lost some of its charms, but in 1883 he visited South Wales in company with his old friend, the Rev. A. Ley, whose walking powers were a little beyond his own. His characteristic neatness was manifested in his packets of mosses, which were arranged with scrupulous care.

Boswell had an extensive correspondence among British botanists, and was in communication with Geheeb and Schimper. He was an excellent letter-writer, as his letters in the Wilson correspondence (preserved in the Natural History Museum) show. It may be of interest to publish one of these, as illustrating his range and methods of work.

Oxford, Aug. 29th, 1864.

Dear Sir,

Your letter of Saturday reminds me that I have too long delayed writing to you, through pressure of various business. Since my visit to Kew I have again had to be in London as well as in Reading, &c. I and my friend Miss Milne (who had a letter of introduction from Mr. Croall) spent two days at Kew, which we much enjoyed. We did not see Sir William, but Dr. Hooker was very civil and kind. He moreover gave me a number of New Zealand and Indian mosses, which have occupied all my leisure time since then, but the Indian ones are not named, only numbered; and, to a letter I wrote him, asking if there were any published names or catalogue to correspond, I have received no reply.

In a former letter of yours, referring to some other New Zealand Mosses and Hepaticæ, you spoke of having found a scrap of *Polyotus** among them "which might possibly be new." Is the enclosed the species referred to? I meant to have sent it to you before, but I forgot it when writing. I send with it another—a *Hypnum*,† apparently of the *hians* group, but which I have not yet had under the microscope. Do you know it?

These Indian and other mosses have quite prevented me from studying the new *Fissidens rupestris*. This morning I have spent half an hour comparing the leaves, and I confess I do not see much difference between them, but this perhaps is my own fault. However, I at present find nothing in the way of clear characters—no other difference than would be caused by the difference of situation and habitat, save only in the bordering of the leaf, which seems really tangibly different.

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* [This was, according to Wilson's note, *P. clavigerus* Gottsche, var. a.—Ed. Journ. Bot.]

† [Wilson notes that this was a *Racomitrium*.—Ed. Journ. Bot.]

Is there any other difference? This alone seems little to found a specific distinction upon. Of course I do not profess, on so slight examination and so poor specimens, to question your decision; only I do not see the proofs of it myself my with own eyes.

It is now some five years since I was at Stokenchurch, and I am not familiar with the details of the locality; but there is a line of chalk hills running round the borders of Oxfordshire and Bucks upon which Stokenchurch is placed. The slopes of these hills are here and there covered with wood, chiefly of beech, in which I have found *Neottia Nidus-avis*, *Monotropa Hypopitys*, *Hordeum sylvaticum*, *Epipactis latifolia* and *grandiflora*, *Polytrichum formosum*, and barren *Neckera crispa*. This *Fissidens* probably grew in some shaded spot where the earth was bare, as the side of a pit or some such place.

I do not think there is anything in the way of rocks anywhere there, save rocks of chalk; and the only stones are flints. But perhaps a short distance from the line I traversed would bring one upon gravel, or even upon the oolitic limestone. I will try to get more exact information by-and-by, and perhaps when the new railway opens to Thame I may go there for a day. Is it possible to get more exact information on the spot?

I have this summer found that my fertile plants of "*B. pseudo-triquetrum*" from Bullingdon have all synoicous flowers! and it seems that *B. bimum* (fruiting) and *B. pseudo-triquetrum* (with female flowers and also I believe with male) grow there, and having found non-fruiting plants dioicous I had confounded them all together. I have been trying to find some other tangible difference besides the inflorescence, but fail to do so. They seem to me undistinguishable without dissection, more so than *B. torquescens* and *capillare*.

I am very sorry to hear that Wybunbury too is going to be cultivated. What will the next generation of botanists do? There will be nothing but cornfield weeds for them to study. Every summer makes a difference hereabouts, and many spots where I gathered flowers and mosses within these four or five years are now destroyed.

Yours very truly,
H. Boswell.

One of the reasons which led him to give up field-work was the encroachment which drainage, cultivation, and building operations made upon his favourite localities, to which he alludes in this letter. I scarcely ever talked with him without his referring to the former glories of Shotover or Bullingdon. This regret he thus expresses in the *Flora of Oxfordshire*:—"During the last thirty or forty years the increase of drainage and cultivation has continued at an accelerated pace, and many places once yielding good botanical prospects have been destroyed. Shotover, the famous haunt of Oxford naturalists, has suffered great deterioration, though a little yet remains; Bullingdon Green, once free and open, has been ploughed and enclosed; the adjacent bog, so rich in flowers and mosses a quarter of a century ago, is drained, and yields not much now but a wretched crop of bad corn and worse potatoes. Of Wychwood Forest little is left, and that little constantly diminishing, many acres of pleasant woodland having been turned into a desert of naked fields intersected by equally naked and very ugly stone walls, and everywhere similar processes have been more or less actively going on; nor has the builder's assistance been wanting, many old botanizing grounds being now covered with houses."

Boswell had no sympathy with the maker of micro-species, and the unconditional surrender of Braithwaite to Lindberg's nomenclature rather prejudiced him against the law of priority. He had very decided opinions, not only on botanical matters, but also on political and social matters; but he took no active part either in municipal work or in political contests. He behaved with great generosity to me when I was compiling my *Oxfordshire Flora*, and gave me a large number of localities. In 1894 he allowed me the use of his note-book, that I might transcribe his records for my *Berkshire Flora*, a privilege which I valued very greatly. He was a member of our local Natural History Society, and read an important paper on Sphagnums at one of its meetings. I have asked Mr. H. E. Garnsey, whose friendship with Mr. Boswell was of older date and closer nature than my own, to express his estimate of Boswell as a bryologist, and he writes as follows:—

"I can say but little about Mr. Boswell's earlier years, for our friendship did not ripen into intimacy till within the last twenty years of his life. He has told me that as a boy he took a pleasure in the sights and sounds of nature; and though a botanist chiefly from the first, he did not confine his attention to the vegetable kingdom, but acquired no slight knowledge of other branches of natural history, the notes of birds being a favourite study with him among other things. But it was to botany that he especially devoted his time and labour; and while still a young man he had made himself a competent authority on British flowering plants generally and on those of his own district of England in particular. His work with the Phanerogams, and his views in dealing with them, always seemed to me to be conceived more in the modern spirit than were the labours of most of the English botanists of that time.

"It was after this period of his life—the exact time I cannot fix—that he began to give special attention to the Muscineæ, and it was thus that he became associated with the band of Lancashire botanists, who did so much in the early part of the century to enlarge our acquaintance with this branch of the vegetable kingdom. He became the companion and friend of Wilson, of Dr. Wood of Manchester, and others, and from his written correspondence with them I learnt the opinion which they entertained of his knowledge and powers, and the value which they set on his judgment in critical questions. It was by the gradual extension of this opinion among a large number of British bryologists that he came to occupy for so many years an almost unique position as a general referee and arbiter in cases of difficulty and division of opinion, a position which he continued to hold as long as he retained his powers of mind and body. He was the frequent companion in what may be called the middle portion of his life of his north country friends in their botanical rambles, and was in frequent communication with them on botanical subjects during the time that the *Bryologia Britannica* was in making; and I have long been under the impression that his collection of British Mosses must contain a large number of Wilson's type-specimens.

"When time had removed or lessened the activity of many of these earlier friends, he found constant occupation in meeting the demands made upon him by collectors who sent him mosses from all quarters of the globe, near and far. To the examining and naming these specimens he gave his time and labour freely and ungrudgingly, and he was thus for some years engaged in a botanical correspondence which few would have been prepared to undertake; but neither time, labour, nor cost interfered in his case with the impulse of natural kindness and profound love of his subject to assist all who, whether strangers or friends, applied to him for help. He would say sometimes, in reply to some remark upon the extent of his labours in this way, that he had his gain from it in increase or confirmation of knowledge, and in the additions to his herbarium; and that if he possessed any special power of discriminating forms, or any certainty of judgment in these matters, he owed it in great measure to the large amount of experience which he had gained in working for others. During these years he was in the habit of making short botanical excursions to various parts of the United Kingdom, either alone or with a friend, often with important results.

"Recently, and since the retirement of Mr. Mitten, Mr. Boswell did some work for the authorities at Kew. In connection with the services which he rendered to the Herbarium of the Botanic Garden at Oxford, it should not be forgotten that he not only arranged and named or verified the collection of the Muscineæ there, but enriched it with many additions from his own stores.

"Mr. Boswell by no means confined his studies to his favourite subject. He was well-read in general literature; he had formed reasoned views on most important topics, and could give interest to their discussion. It was natural, therefore, that those whom he admitted to his intimacy enjoyed his society, while his amiable and generous disposition, his uprightness of character, and his gentle unassuming way, secured their warm respect and regard."

After the death of his wife, in 1888, Boswell became of more sedentary habits, and in 1894 it became evident that general paralysis had asserted itself. From this time his faculties gradually failed, and he passed away on Thursday, February 4th. He was buried at the Cemetery of St. Sepulchre on the following Tuesday. His herbarium has become the property of the Oxford Botanic Garden.

G. Claridge Druce.

FERTILIZATION OF SPRING FLOWERS ON THE YORKSHIRE COAST.

By I. H. Burkill, M.A., F.L.S.

(Continued from p. 99.)

Class V. (B.) Flowers with honey completely concealed.

Prunus communis Huds.—**Hl.**: Apis mellifica L., sh. and cp.; Bombus terrestris L., sh. **Dm.**: Volucella bombylans L., sh.; Eristalis pertinax Scop., sh.; E. arbustorum L., sh. **Ds.**: Calliphora erythrocephala Mg., sh.; Pollenia rudis F., sh., abundant; Lucilia cornicina F.; Stomoxys sp.?, sh.; Scatophaga stercoraria L., sh., abundant; Phora sp.?; Sepsis nigripes Mg., fp. All observed in '96.

Veronica agrestis L.—No visitors.

Veronica persica Poir.—**Hm.**: Andrena gwynana K., ♀, '95; A. clarkella K., ♂, '95. **L.**: Vanessa urticæ L., '95. **Ds.**: Lucilia cornicina F., '95; Phora sp., '95, '96; Sepsis nigripes Mg., '95. All at honey.

Veronica arvensis L.—No visitors.

*Veronica hederifolia L.—**Hm.**: Andrena gwynana K., ♀. **Hs.**: Formica fusca L., 2 spp. of ichneumons. **Ds.**: Sepsis nigripes Mg. **C.**: Apion nigritarse K. **Hem.**: 1 sp. **T.**: Thrips sp. All sh., '95.

[*Geranium Robertianum* L.—No visitors. Competing garden species:—*Helleborus viridis* L.—**Hl.**: Bombus terrestris L., sh., '96. *Cheiranthus Cheiri* L.—**Hl.**: Bombus terrestris L., sh., '96. *Arabis caucasica* Willd.—**Dm.**: Eristalis pertinax Scop., sh., a frequent visitor. *Ribes sanguineum* Pursh.—**Hl.**: Bombus terrestris L., '96.]

Class VI. (B′.) Aggregated flowers with honey completely concealed.

*Bellis perennis L.—**Hl.**: Bombus terrestris L., '95. **Hm.**: Andrena gwynana K., ♀, '95; A. clarkella K., ♂, sh., '95. **Hs.**: an ichneumon, '95. **L.**: Pieris rapæ L., sh., '95; Vanessa urticæ L., sh., '95. **Dm.**: Eristalis pertinax Scop., fp., '95, '96; Syrphus lasiophthalmus Ztt., '95; Melanostoma quadrimaculatum Verrall, '95. **Ds.**: Calliphora cognata Mg., sh. and fp., '96; Lucilia cornicina F., sh. and fp., '95, '96, abundant; Pollenia rudis F., '95, '96; Scatophaga stercoraria L., sh. and fp., '95, '96, particularly abundant in the latter year; Helomyza sp., '95; Dilophus albipennis Mg., '96; Sepsis nigripes Mg., fp., '95, '96; Ephydrid, '95. **C.**: Meligethes sp., '95; Apion striatum K., '95. **Araneida**: Xysticus pini Hahn, lying in wait, '95.

Tussilago Farfara L.—**Hl.**: Apis mellifica L., sh. and cp., '95; Bombus terrestris L., sh., '95, '96; B. agrorum F., sh., '95, '96. **Hm.**: Andrena clarkella K., ♂ and ♀, sh., '95; A. gwynana K., ♂ and ♀, sh., '95; A. nigroænea K., ♂ and ♀, '95. **Hs.**: Formica fusca L., '95; 2 spp. of ichneumon, sh., '95, '96. **L.**: Vanessa urticæ L., sh., '95. **Dm.**: Eristalis pertinax Scop., sh. and fp., '95, '96;

E. horticola Deg., '95; Syrphus lasiophthalmus Ztt., '95; S. maculatus Ztt., '95; Platychirus sp., '96; Melanostoma quadrimaculatum Verrall, sh., '95. **Ds.**: Calliphora cognata Mg., sh., '95, '96; C. erythrocephala Mg., sh., '95; C. vomitoria L., sh., '95; C. sepulchralis Mg., sh., '95; Lucilia cornicina F., sh. and fp., '95, '96; Pollenia rudis F., '95; Scatophaga stercoraria L., sh. and fp., '95, '96; Hylemyia sp., '95; Lasiops sp., sh., '95; Phorbia sp., '95, '96; Coelopa sp., '96; Helomyza sp., fp. and sh., '95; Actora æstuum Mg., fp., '96; Sepsis nigripes Mg., sh. and fp., '95, '96; Ephydrid, 1 sp., '95; Phora sp., '95, '96; Cecidomyia sp., '95; and 2 other species of fly. **C.**: Meligethes picipes Sturm, fp., '95, '96; Omalium florale Payk., '96; Thyamis fuscicollis Foudr., '95. **T.**: Thrips sp., '95. **Araneida**: Xysticus pini Hahn, frequently lying in wait for flies, '95.

Petasites fragrans Presl. — **Dm.**: Eristalis pertinax Scop.; Melanostoma quadrimaculatum Verrall. **Ds.**: Calliphora cognata Mg., fp.; C. sepulchralis Mg., fp.; Lucilia cornicina F. All '95.

*Petasites vulgaris Desf.—**Hl.**: Bombus terrestris L., sh., '96. **Hm.**: Andrena gwynana K., ♀, '95. **Ds.**: Chironomus sp., '95. **Hem.**: Heterocordylus sp., '95.

*Senecio vulgaris L.—**Ds.**: Anthomyiid?, '95.

*Taraxacum officinale Web. — **Hl.**: Apis mellifica L., sh., infrequent, '96; Bombus terrestris L., sh., '96; B. muscorum F., sh., '96; B. agrorum F., sh., '96. **Hm.**: Andrena gwynana K., sh., '96; A. clarkella K., '96; Nomada borealis, sh., once, '96. **Hs.**: 1 sp. of ichneumon, sh.,' 96. **L.**: Pieris rapæ L., sh., '96; Vanessa urticæ L., sh., '96. **Dm.**: Eristalis pertinax Scop., sh., '96; E. arbustorum L., sh., '96. **Ds.**: Calliphora erythrocephala Mg., '96; Lucilia cornicina F., sh., '96; Stomoxys sp.?, fp., '96; Scatophaga stercoraria L., sh. and fp., '96, most frequently fp.; Helomyza sp., sh., '95; Sepsis nigripes Mg., sh., '95, '96; Dilophus albipennis Mg., fp., '96; Phora sp., '96. **C.**: Meligethes picipes Sturm, sh. and fp., '96; Apion sp., '96. **T.**: Thrips sp., '96.

[*Sonchus oleraceus* L.—No visitors.]

Class VII. (H.) Bee-flowers *par excellence.*

Viola odorata L.—No visitors seen.

Viola canina L.—**Hl.**: Bombus terrestris L., sh., '96. **Ds.**: Sepsis nigripes Mg., sh., '95. Each once.

Ulex europæus L.—**Hl.**: Apis mellifica L., cp. and sometimes seeking h., '96, frequent; Bombus terrestris L., cp. and seeking h., '96; B. lapidarius L., seeking h., '96. **Hm.**: Andrena clarkella K., cp.?, '96. **Dm.**: Eristalis pertinax Scop., seeking h., '96; E. arbustorum, fp., '96; Melanostoma quadrimaculatum Verrall, fp., '95. **Ds.**: Lucilia cornicina F., seeking h., '96; Hylemyia sp., seeking h., '95; Sepsis nigripes Mg., seeking h., '96; and another species of fly, '96. **C.**: Meligethes picipes Sturm, fp., '96; Apion ulicis Forst., '95; Micrambe vini Panz., fp. and seeking h., '95, '96. **T.**: Thrips sp., '95, '96; very abundant in '95. **Araneida**: Philodromus aureolus Clerck, lying in wait on unexploded flowers and within the keel of exploded flowers, '95.

Lathrea squamaria L.—No visitors seen.

*Nepeta Glechoma Benth.—**Hl.**: Bombus agrorum F., sh., '96. **C.**: Meligethes sp., sh., '95. **T.**: Thrips sp., '95.

*Lamium purpureum L.—**Hl.**: Bombus agrorum F., sh., '96. **L.**: Vanessa urticæ L., sh., '95. **Ds.**: Lucilia cornicina F., fp., '95; Sepsis nigripes Mg., seeking h., '95.

Narcissus Pseudo-narcissus L.—**Hm.**: Andrena clarkella K., ♀, seeking h., but unable to reach it, '95. **Dm.**: Eristalis pertinax Scop. (in a garden), seeking h.?, '96. **Ds.**: Phorbia muscaria Mg., aimlessly seeking h. in every part of the flower, in doing which it probably would sometimes self-fertilize the flower, '95; another fly, seeking h., '95. **T.**: Thrips sp., '95, '96. **Acarina**: 1 sp. wandering in the flower, '96.

[To *Viola arvensis* Murr., *Vaccinium Myrtillus* L., *Lamium amplexicaule* L. (only cleistogamic),—no visitors. Garden competitor:—*Hyacinthus orientalis.*—**Hl.**: Apis mellifica L., sh., '96; Bombus terrestris L., sh., '96. **L.**: Vanessa urticæ L., sh., '96.]

Class VIII. (F.) Butterfly-flowers *par excellence.*

Primula vulgaris Huds. — **Hm.**: Andrena gwynana K., ♀, seeking h., '95, '96, but quite unable to reach it. **C.**: Meligethes picipes Sturm, sh., '96; Euspalerum primulæ Steph., devouring anthers, '96. **T.**: Thrips sp., '95, '96, extremely abundant.

Lychnis diurna Sibth. — No visitors. Garden competitor:—*Crocus* spp.—**H.**: Apis mellifica L., sh. and cp.; it appears to be just able to reach the surface of the honey by a great effort. '95, '96.

Summing up the number of species of insects visiting the various species of plants within the same class, we get the following table:—

Table II.—Distribution of Species of Insects among the Classes of Flowers.

	Hl.	Hm.	Hs.	L.	Dm.	Ds.	C.	Etc.	Total.
W	—	—	—	—	1	1	—	—	2
Po	1	—	—	—	1	2	—	2	6
A	6	6	5	1	11	51	4	7	91
AB..........	3	5	9	1	7	29	7	6	67
B	5	3	3	1	4	11	1	1	29
B′	9	8	5	5	13	40	7	5	92
H	8	2	—	2	4	7	4	5	32
F	1	1	—	—	—	—	2	1	5
Total....	33	25	22	10	41	141	25	27	324

If from this table the percentages of the groups of insects visiting each flower-class be calculated, it will be seen that the long-tongued bees associate themselves mostly with Class H, where they make 25 per cent. of the visitors, and that they associate less with the others, in the case of Class AB making only 4·5 per cent. of the species-visits. In the same way it will be seen that the mid-tongued bees visit mostly flowers with more accessible honey; excluding Class F from consideration by reason of the insufficiency of the facts to hand, we find them making 10 per cent. of the visitants to Class B, 8·7 to Class B′, 7·2 to Class AB, and 6·6 to Class A. The short-tongued Hymenoptera visit most freely Class AB. Thus do these three divisions of the Hymenoptera make a series. The Lepidoptera are mostly found on the higher, if not the highest types, while the mid-tongued flies associate with the mid-tongued bees. The short-tongued flies, absent on Class F, form 21·9 per cent. of the species-visits to Class H, 33·3 to Class Po, 37·9 to Class B, 43·3 to Class AB, 43·5 to Class B′, 50·0 to Class W, and to Class A, the simplest which affords them honey, 56·0 per cent. And the Coleoptera and Thysanoptera, which, by reason of their small size, can creep into flowers, are found most abundantly in the highest types, where food and shelter are obtained to the greatest extent. The law that the higher types of flower and the higher types of insect are mutually dependent has been so well established by continental observers that we may pass on without further comment to the consideration of the distribution of the individuals.

TABLE III.—DISTRIBUTION OF INDIVIDUALS VISITING AMONG THE CLASSES OF FLOWERS.

	Hl.	Hm.	Hs.	L.	Dm.	Ds.	C.	Etc.	TOTAL.
W	—	—	—	—	2	1	—	-	3
Po	2	—	—	—	3	7	—	7	19
A	95	8	10	2	19	360	5	12	511
AB	2	22	37	4	34	191	18	26	334
B	17	3	7	1	15	56	1	3	103
B′	32	72	14	11	93	1540	22	33	1817
H	31	2	—	2	7	19	15	283	359
F	5	2	—	—	—	—	8	210	225
TOTAL....	184	109	68	20	173	2174	69	574	3371

Here we enter almost new ground. Table III. expresses the number of individuals seen visiting flowers of the different types, and includes the meagre observations of '94, while Table IV. expresses the same calculated in percentages. We will compare the result.

In Table IV., the lowest line, which gives the percentages of the whole of the flower-visiting insects observed, may be taken as a standard of comparison. The more widely any of the percentages given in the lines above differ from them, the more do the insects under consideration seek or avoid that class of flowers; thus the Class B attracts thrice its share of the long-tongued bees, Class AB twice its share of mid-tongued bees, and Class B′ only one-third of its share of short-tongued Hymenoptera. Considering next the most numerous insects—Diptera—it is noted that Class A attracted more than its share of the short-tongued flies, and less than its share of the mid-tongued flies; Class A B, with the honey half-hid from the visiting insects, attracted more of the mid-tongued flies, and a less percentage of short-tongued flies; Class B attracting more than its share of long-tongued flies, less of short-tongued Diptera, makes a third to this series, which here suddenly is broken by the great numbers of Muscidæ and Scatophagidæ visiting Class B′. Of the other classes, H and F are neglected by the flies to whom the honey is quite unattainable. Of W and Po in the scarcity of facts it is unsafe to speak. The long-tongued bees are noticed to be individually scarce on the *Compositæ*, while on Classes B and A they are fairly numerous. The small percentages for the bees on Classes H and F are due to the immense numbers of Thrips thronging these flowers. The mid- and short-tongued bees are specially numerous on Class AB.

TABLE IV.—PERCENTAGE-DISTRIBUTION OF INSECTS VISITING THE VARIOUS CLASSES OF FLOWERS.

	Hl.	Hm.	Hs.	L.	Dm.	Ds.	C.	Etc.
W	—	—	—	—	66·67	33·33	—	—
Po	10·53	—	—	—	15·79	36·84	—	36·84
A	18·59	1·57	1·96	·39	3·72	70·45	·98	2·34
AB	·60	6·59	11·08	1·20	10·18	57·19	5·39	7·78
B	16·50	2·91	6·80	·97	14·56	54·37	·97	2·91
B′	1·76	3·96	·77	·61	5·12	84·75	1·21	1·82
H	8·64	·56	—	·56	1·95	5·29	4·18	78·83
F	2·22	·89	—	—	—	—	3·56	93·33
TOTAL....	5·46	3·24	2·02	·59	5·13	64·49	2·05	17·03

At a season when 64·5 per cent. of the flower-visiting insects are short-tongued flies, it would seem that the most successful species should be the flowers fertilized by them. Perhaps it is so, and *Tussilago*, *Bellis*, and *Taraxacum* may be dominant on that account.

In Table V. the dominant species of the period under investigation have the proportions of the insects abroad and flower-visiting assigned to them. Some explanations are necessary. In '95 the long cold winter caused the vegetation to be about a week later than that of '96, when the winter had been extremely mild. Therefore the weeks (*see* Table I.) do not correspond, but that lettered C (Mch. 30 to Apr. 5, '95) corresponds to c. (Mch. 23 to 29, '96); similarly D. and d. correspond. In Table V. these have been added together. When a species was at the height of its flowering period, the percentages of the visiting insects seen on it are in heavy type; when only commencing or ceasing to flower, the figures are in italics. Thus it is seen that *Tussilago* began to flower before observations were commenced, reached its best in weeks B, C, and D, and after this diminished. At first 83·2 per cent. of the insects abroad visited it, then *Bellis* began to compete seriously, then *Salix*, and then when *Tussilago* had nearly ceased *Taraxacum* came forward. These species all were abundantly visited by flies (as will be shown in

Table VI. for *Tussilago*, *Bellis*, and *Salix*). Of these dominant species, which, as shown in Table IV., were alike much frequented by short-tongued flies, three belong to Class B′, and *Salix* to Class A.

TABLE V.—COMPETITION AMONG THE DOMINANT FLOWERS FOR THE AVAILABLE INSECTS.

	A.	B.	C.	D.	E.	F.
Salix spp.	Not in flower.		*22·37*	10·22	**7·27**	**19·32**
Ranunculus Ficaria . .	*3·75*	*6·90*	2·89	**4·11**	**·75**	**6·80**
Prunus communis	Not in flower.				1·50	**10·05**
Bellis perennis	*2·37*	*17·24*	18·18	**32·66**	**10·28**	**24·42**
Tussilago	83·20	**43·10**	**22·66**	**31·51**	·50	*6·03*
Taraxacum	*0*	*0*	*·43*	*·42*	11·28	**13·76**
Ulex	*6·13*	23·56	**9·81**	**4·74**	**2·51**	**1·85**
Primula	*0*	*0*	*0*	1·05	**35·34**	**10·66**

CONSIDERATION OF SOME SPECIAL CASES.

Ranunculus Ficaria, which so extremely rarely sets seed, is an enigma. This failure in seed-production cannot be due to want of fertilization, for the flowers are visited by a considerable variety of insects, though not very freely. The mid-tongued bees are fewer in number with us than in Germany or Belgium, and in consequence we find fewer species on the flowers of this plant. The following is a comparison of the species visiting. In this and the following cases the statistics for Low Germany are drawn from the works of H. Müller,[*] those for Belgium from that of MacLeod.[†]

	Hl.	Hm.	Hs.	L.	Dm.	Ds.	C.	Etc.	TOTAL.
Yorkshire	2	3	2	1	6	6	3	1	24
Belgium	1	3	1	—	—	3	1	—	9
Germany	1	8	—	—	—	4	1	1	15

Comparing '95 and '96 (*see* Table VI.), we note that in the second year insects of mid-tongue length (Andrena and Syrphidæ) appear to visit less seldom, while the more inefficient fertilizing agent Scatophaga takes their place.

Cochlearia officinalis. — It is now well established that the biological features of the flower may differ in different parts of the plant's distribution-area. This species offers an instance. Knuth failed to perceive nectaries in the flowers of North Friesian plants,[‡] but in the Scarborough plants there are four very obvious nectaries at the base of the flower. The stamens shed their pollen upwards and inwards at a distance of 1 mm. from the stigma, so that in the homogamous flowers an insect seeking honey, unless it be very small, will simultaneously touch with one side of its body a stamen and with the other the stigma. Small insects like Sepsis leave the flower abundantly covered with pollen. The plant is restricted to the most windy, exposed headlands on the coast; on these, however, it abounds.

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[*] *Fertilization of Flowers*, and 'Weitere Beobachtungen,' i., ii., & iii. in *Verhandl. d. Nat. Verein d. Preuss. Rheinlande*, xxxv. (1878), xxxvi. (1879), and xxxix. (1882).

[†] 'Over de Bevruchting der Bloemen en het Kempisch gedeelte van Vlaanderen.' *Bot. Jaarboek*, v. 156 (1893), and vi. 119 (1894).

[‡] *Blumen und Insekten auf den nordfriesischen Inseln.* Kiel & Leipzig, 1894, p. 29.

TABLE VI.—INDIVIDUALS VISITING FOUR DOMINANT FLOWERS.

		FICARIA.		BELLIS.		TUSSILAGO.		SALIX SPP.	
		'95.	'96.	'95.	'96.	'95.	'96.	'95.	'96.
HYMENOPTERA.	Apis	1	—	—	—	6	—	1	54
	Bombus	—	—	1	—	1	5	3	37
	Andrena	8	4	2	—	64	—	4	4
	Ichneumons	3	—	1	—	9	1	5	1
	Ants	1	—	—	—	1	—	—	—
	Lepidoptera	2	2	1	1	1	—	1	1
DIPTERA.	Syrphidæ	23	9	8	11	45	18	8	7
	Empidæ	—	1	—	—	—	—	—	1
	Muscidæ	18	13	51	34	343	15	9	3
	Scatophagidæ	3	23	141	294	144	93	8	54
	Other Flies	7	7	106	17	180	30	153	49
	Coleoptera	2	9	3	—	5	3	—	1
	Etc.	1	1	1	—	28	—	5	—
	TOTAL	69	69	215	357	832	165	197	212

Capsella Bursa-pastoris. — It has been suggested that the gynodiœcism and gynomonœcism of this plant is brought about by cold.* My Scarborough observations very strongly support this contention. The plant soon came into flower after the severe frost of January and February, '95, but every flower on hundreds of plants which were examined bore only rudimentary stamens until April 9th, upon and after which ☿ flowers began to appear all over the district.† In '96, after a mild winter, the earliest flowers of all the early-flowering inflorescences were observed to be ♀, but ☿ flowers began to appear towards the end of March. In consequence the plant did not lose much by the absence of visitors, for with or without them fertilization was impossible. Sex-separation such as this is in no way an adaptation leading to cross-fertilization, as is that in many more highly-specialized flowers.

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* Willis, "On Gynodiœcism (third paper), with a preliminary note upon the origin of this and similar phenomena," *Proc. Cambridge Phil. Soc.* viii. (1893), p. 130. It may be noted that the plants spoken of in this paper "had just begun to flower."

† The same state of things was noted in Germany in this year. See Warnstorf, "Blüthenbiologische Beobachtungen aus der Ruppiner Flora in Jahre 1895," *Abhandl. d. bot. Vereins Brandenburg*, xxxviii. 1896, p. 15.

The ♀ flowers averaged about 3 mm. in diameter, and therefore are not larger than the ☿ flowers as were those recorded by Breitenbach* from S. Germany.

The contabescent stamens were at the most 1 mm. long. Contabescence was seen also in single flowers of *Cerastium triviale*, *Adoxa Moschatellina*, *Tussilago Farfara*, and *Chrysosplenium oppositifolium*.

Chrysosplenium alternifolium. — The first-formed terminal flower of an inflorescence usually has a tendency to become 5-merous. This results in the formation of a fifth undersized sepal. In front of it stands a stamen, but one or both of those which should form on either side of it are absent. Thus we get either eight or nine stamens in such flowers.

Müller remarks the similarity of the flower of this to that of *Adoxa*, and that it is fertilized in similar insects.† This is so at Scarborough, where *Adoxa*, *Chrysosplenium alternifolium*, and *C. oppositifolium* all grow together.

(To be continued.)

SHORT NOTES.

"CAREX DISTICHA *Huds.* b. LONGIBRACTEATA *Schleich.*" — This name appears in the ninth edition of the *London Catalogue*, and as I wasted the greater part of an afternoon in endeavouring to trace it, it may be worth while to place its history on record, in order that others might be spared a fruitless search. The name appears as cited above in a paper by Mr. Druce on Oxford plants published in this Journal for 1890 (p. 232). No diagnosis is appended, nor any other information as to the plant save the locality "Bullingdon"; and there is nothing to lead one to suppose that this is the first publication of the varietal name. Such, however, is the case: Mr. Druce informs me that he knows of no other publication, and adds that "the name is given in MS. on a plant collected by Schleicher which is in Herb. Oxon." Here, however, it is not named as a variety, for Mr. Druce tells me the label runs "*Carex disticha* var. *Carex longibracteata* Schleich." The name appears in Schleicher's *Cat. Pl. Helvet.* ed. 4, p. 11 (1815), where it is indicated as new. Neither here nor elsewhere is any diagnosis of the plant published. The name seems to indicate a form rather than a variety, and this seems true of another plant mentioned by Mr. Druce in his paper (p. 230) as "*Pulicaria dysenterica* var. *longiradiata* mihi." I had imagined that this was the first publication of this name, but Mr. Druce kindly refers me to a note which he published in the *Midland Naturalist* for 1887 (p. 78), where he describes the plant as differing "considerably from the usual state in having the ray ligules narrow strap-shaped, half an inch long: the flowers of the disc were normal and fertile, nor did the plant in habit differ from the type." In the same year (but, Mr. Druce tells me, later) the plant was published by Mr. F. A. Lees in the Report of the Botanical Record Club for 1884-6 (p. 129) as *P. dysenterica* var. *pulchella*—"a handsome form, less cottony than the type, with beautiful long-rayed flowers." It seems to me that if forms such as this are to be raised to the rank of named varieties, there is no limit to the extension which our nomenclature may receive. It is unnecessary to dilate on the extreme impropriety of putting into circulation such *nomina nuda* as that of the *Carex* referred to, and its inclusion in the *London Catalogue* without investigation is to be regretted. I may take this opportunity of noting that the name *Utricularia ecalcarata* Welw. which has been frequently quoted by Messrs. West from Welwitsch's MS. notes in their paper on his Freshwater Algæ has not hitherto been, and should not have been, published: Mr. Hiern informs me that it = *U. cymbantha* Oliv.—JAMES BRITTEN.

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* *Einige neue Fälle von Blumen-Polymorphismus*, Kosmos, 1884, iii. p. 206.

† *Fertilization of Flowers*, p. 245.

CROCUS VERNUS IN BERKS.—This plant occurs in unusual abundance in a hilly meadow at Inkpen, Berks. I was first informed that it grew here by Miss M. Beales, of West Woodhay; but it has been noticed in this locality by the villagers for at least fifty years past, and no one seems to be able to account for its introduction. I visited the place last March in company with my friend Mr. G. C. Druce, and we found the Crocus in great plenty, forming two extensive patches which seem to be spreading considerably. The situation is wild enough, and there are no gardens near from which the plant can possibly have escaped. The Crocus grew so thickly that the beautiful mauve colour of the flowers was conspicuous at a distance of three or four hundred yards. The plant is certainly as well naturalized at Inkpen as in the other English localities recorded for it. Mr. Druce informs me that *Crocus vernus* grows in similar situations in the hilly districts of France and Switzerland, where it is of course native. This is an interesting addition to the county flora, especially as I am informed that the Nottingham station for the plant is likely to be destroyed by the builder.—A. B. JACKSON.

SCIRPUS CARICIS Retz. — Specimens of this species gathered as long ago as 1871 were only lately suspected of extending the distribution. Mr. Arthur Bennett tells me that this is an addition not only to N. Devon, but also to the Peninsular Province. — EDWARD F. LINTON.

POPULUS CANESCENS Sm. IN SOMERSET.—In my *Flora of Somerset* I have treated the records of this tree as of very doubtful authority. Since the publication of the *Flora*, my attention has been again called to the point, and after a very careful examination of the imperfect material at our disposal, Mr. Linton and I are quite convinced that we were too hasty on a former occasion, and that Mr. White's plant was this species.—R. P. MURRAY.

ISLE OF MAN PLANTS. — I can slightly reduce Mr. Bennett's list of common plants not yet recorded from the Isle of Man. *Geum urbanum* and *Ægopodium Podagraria* were common weeds forty years ago in a shrubbery near Douglas. *Listera ovata* was frequent near Mount Murray. *Lamium album* occurred in nursery ground at

Onchan, as an obvious introduction. A single plant of *Pneumaria maritima* was once pointed out to me on the shore of Poolvash Bay, whither the seed must have been carried by bird or current. Unfortunately it was soon destroyed—crushed by a passing cart.—R. P. Murray.

The Irish Record of Callitriche truncata.—One of the localities given for this species in Babington's *Manual*, eds. 7 and 8, is Glansiskin, Co. Cork, but we do not know of any other record of its occurrence in Ireland. Mr. Scully recently sent us a *Callitriche* from the late Mr. A. G. More's herbarium, collected at Glansiskin, which was supposed to be the plant, but upon examination we found it to be *C. hamulata*. By the kindness of Prof. Marshall Ward we have since had the opportunity of examining the specimen in the Cambridge Herbarium, collected by Mr. I. Carroll at Glansiskin and labelled *C. truncata* by Prof. Babington, and this also proved to be *C. hamulata*. There does not therefore appear to be any evidence that *C. truncata* is an Irish plant. It is, however, quite likely that it may yet be found in the south or west, inasmuch as it occurs in the South of England, Guernsey, and the West of France. — H. & J. Groves.

Narthecium Ossifragum in E. Gloucestershire.—When staying at Cheltenham last summer, I found *Narthecium Ossifragum* growing near the top of the Cotswolds, at an altitude of between eight and nine hundred feet. I believe it has not been recorded for East Gloucestershire.—Harold J. Burkill.

NOTICES OF BOOKS.

First Records of British Flowering Plants. Compiled by William A. Clarke, F.L.S. Reprinted with Additions and Corrections from the 'Journal of Botany,' 1892–6, together with a Note on Nomenclature. 8vo, pp. 103. London: West, Newman & Co. Price 3s. 6d.

Even among those British botanists who already possess this interesting catalogue in the pages of the Journal, there will, I think, be many who will be glad to have it in this convenient form. The issue of such lists in serial form has its conveniences, no doubt, but it also has serious drawbacks, chief among which is the difficulty of consultation. Here, however, we have the whole list brought together, and rendered additionally easy to consult by the thoughtful provision of an index.

The readers of the Journal need no demonstration of the interest attaching to these *First Records*, which, although occasional corrections may be made,* will take rank as a definite contribution to the historical side of our knowledge of British plants. Mr. Clarke has done his work with great care, and the help which my connection with the National Herbarium enabled me to give him—help which is more than fully acknowledged in the preface—has resulted in the addition of many details gathered from the valuable collection of British plants which that Herbarium contains.

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* One such is required in the case of *Pyrola secunda*, for Mr. F. A. Lees has shown (*Fl. West Yorkshire*, p. 322) that Ray's record does not refer to this species.

But Mr. Clarke has appended a "Note on Nomenclature" which did not appear in the Journal, and from which I learn that the names in his list, although tolerated by him, do not meet with his approval. I propose to comment upon this Note somewhat in detail, as it illustrates the curious confusion of mind which prevails among many who are opposed to the rule of priority. Mr. Clarke, I am glad to see, does not countenance the curiously inaccurate statement of Dr. Dyer * that "it is almost impossible to reach finality" in matters of nomenclature; his objections are restricted to questions of convenience and sentiment. I should be sorry if anything I may say about the Note should be considered to detract in the slightest degree from the value and interest of the book, of which it forms but an insignificant portion.

The Note, indeed, reminds me of Dickens's "Dog of Montargis," who occupied one minute in his performance, and two lines in the bill; for although it figures prominently in the title, it takes up little more than a page. It is a "plea for convenience" in its crudest and most restricted form—a plea, that is to say, for our *present* convenience, Mr. Clarke apparently adopting the view that posterity must look after itself, and that antiquity has no practical claims on our regard. The rule of priority, he says in effect, is an excellent one, if you don't carry it out: "it is an abuse of this rule to make it an excuse for changing the name of any plant which has been for a long period (say fifty years or more) known by one name without the active competition of any synonym."

Mr. Clarke "makes [his] meaning quite clear" by means of "a few instances." (He makes it clearer than he altogether intends, I think; for it is apparent that he has objections to names that are "uncouth," "meaningless," "vexatious," and the like.) *Ranunculus sardous*, for instance, in place of *R. hirsutus* Curt.: "who is the better for such a change as this?" Mr. Clarke seems to fancy that some moral principle is involved in nomenclature, such as that which prefers kind hearts to coronets. "Surely in this case there was absolutely no occasion or excuse for any change." None, except the trifling circumstance that Crantz described *R. sardous* in 1763, while Curtis did not publish his *hirsutus* until eleven years afterwards. "A few continental botanists might choose to call the plant *R. sardous*"—they might, nay, they do!—"and we could not say they were *wrong*"—here I am entirely at one with Mr. Clarke—"but no confusion could possibly occur from our adhering to Curtis's long-established and far better name." There is a fine British flavour about this; it is clearly the place of the foreigner to follow the British lead, even if, as an Irishman might say, the lead comes second. It does not seem to have occurred to Mr. Clarke that some inconvenience might arise if every country had its own nomenclature; and it is a little hard on Crantz, foreigner though he was, that he should not be credited with the species which he was the first to diagnose. But what will Mr. Clarke say when he discovers that even Mr. Jackson—who affords him "some consolation" as having "in many instances retained a well-established name notwithstanding the existence of an earlier one"—places *R. hirsutus* as a synonym of *R. sardous?*

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* *Journ. Bot.* 1896, 114, 117.

A more pathetic instance follows. "We have quite lately most unfortunately lost an excellent"—here the unbidden tear rises, but it is not a dear friend, only a name (to which, indeed, even dear friends are often reduced in the lapse of years)—"an excellent name, *Carex glauca* of Scopoli." One wonders how Mr. Clarke would record the loss of a plant, if the disappearance of a name awakens such a threnody. But he mingles a manly indignation with his tears. Why was this outrage perpetrated? "Because, forsooth"—an expression of scorn used with deadly effect by the late Mr. Martin Tupper in one of his spirited denunciations of the Anglican hierarchy—"Schreber one year earlier gave the plant the much inferior name *C. flacca*." Mr. Clarke goes on to show that, half a century ago, *C. recurva* "had the cry," and that Sir J. E. Smith, noting that the name *flacca* was "most prevalent on the Continent"—these foreigners will do anything!—says that he might have restored it; "but as Willdenow has sanctioned *recurva*, this name, being in itself unexceptionable, may as well remain." It is a little unkind of Mr. Clarke to say that Smith's "reasoning is not very conclusive," especially as it is indistinguishable from Mr. Clarke's own. But the moral is plain. If Smith *had* restored *flacca*, Mr. Clarke's feelings would have been spared, and Babington would not have reintroduced Scopoli's later name *glauca*,—a restoration which, apparently because it happened so long ago, meets with Mr. Clarke's approval,—"I entirely fail," he says, "to see any good reason for its being disturbed." So might those who knew and loved *recurva* have said in their day, ere the rude hand of a Babington thrust her from her throne; but the botanists of that less emotional period seem to have viewed the substitution with callous indifference, and to have adopted it without a pang.

"Thus bad begins,"—and continues,—"but worse remains behind." "The last edition of the *London Catalogue* contains several instances of changes as bad or worse," and—*rien n'est sacré pour un sapeur*—even *Capsella Bursa-pastoris*, as well as Mr. Clarke, is "upset"! "How sad and mad and bad" it all is! Mr. Clarke sees no hope for the future save in an appeal to "British botanists" to "protest against such changes being made." Judging from the response—or want of it—to Mr. Marshall's similar appeal,* I fear British botanists are not easily moved; but, as on the former occasion, I gladly give publicity to Mr. Clarke's call to arms. Those who agree with him "are mostly of the quiet and long-suffering class," but even worms will turn (at least so it is reported), and now that a leader has appeared, British botanists may arise and overthrow the tyranny of the bold bad men who drew up the *London Catalogue.*

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* *Journ. Bot.* 1895, 229.

"However," concludes Mr. Clarke, "*liberavi animam meam.*" So have I.

James Britten.

Flora of Somerset. By the Rev. R. P. Murray, M.A., F.L.S. Taunton: Barnicott & Pearce. 1896. 8vo, pp. lxi, 437. Price 16s. net.

Mr. Murray's Flora, which has appeared in four numbers of the *Proceedings* of the Somerset Archæological and Natural History Society, is now offered to the botanical public in one volume. Those acquainted with the author's previous work expected nothing less than a Flora of first-class botanical excellence. This expectation will be fully realized. The information, moreover, is remarkably easy of access; it is arranged on a clear and simple plan, printed in good type without crowding or excessive abbreviation, and above all it is followed by one excellent index of all the species mentioned. For the neatness and excellent "get-up" of the book the local publishers deserve high commendation. A good though somewhat stiff representation of the Cheddar pink faces the title-page.

The introduction gives agricultural, physical, and meteorological statistics of the county, lists of species coming under Watson's various types of distribution (Atlantic 43, Germanic 5, Scottish 15), an enumeration of the six species (two now extinct) and one variety peculiar to the county, adding a few more confined to this and a few other counties. There follows a list of plants of doubtful occurrence, and finally ten extinctions. Fortunate indeed, nowadays, is the author who has not to reveal an increased number of species exterminated by drainage, building, or collectors' greediness. The losses of Somerset, however, are really smaller than the above figure represents, for two (*Vicia lutea* L. and *V. hybrida* L.) which grew "in a sand-pit," and "potato-grounds" seem hardly to have deserved the name of "natives." The undoubtedly wild British stations of *V. lutea* are on sea-cliffs and beaches. Its position on Glastonbury Tor in cultivated ground conforms better with its continental habitat, from which we may suppose it to have come, as it undoubtedly has in Kent. *V. hybrida* is subject to the same criticism, and their disappearance is far less serious than the extinction of a native. Another of the ten, *Scirpus Holoschœnus*, has been rediscovered, and appears in the "Further Addenda." The others seem to be really lost. Mr. Murray draws a pathetic picture of *Cyperus longus* in 1883, "still dragging on a miserable existence, appearing here and there among potatoes . . . doomed if not already succumbed in the struggle for existence." Exemplary reticence with regard to its exact locality may save *Asplenium septentrionale* from a like fate at the hand of "fern collectors."

Following the introduction is a list of books and pamphlets referred to in the work. Of these Mr. White's excellent little *Flora of the Bristol Coalfield* may be said to form the basis of the flora of the extreme north of the county. Babington's *Flora Bathoniensis*, which also deals with the N.E. corner, should not perhaps have been quoted so often without comment; the list was made by the writer as a schoolboy, destined indeed to future greatness, but not free from the blind generosity of youthful observers. A few references such as *Rumex pulcher*, "common on roadsides; Fl. Bath." are misleading; they are not now, even if they ever were, true.

The botanical divisions of the county are next defined, and each is described geologically, physically, and botanically. The number of species known in each district shows a variation of from 409 in the little searched Dulverton division to 876 species in that of Mendip. The latter owes its superiority to the varied habitats which it presents on its high ground around Cheddar, flat marshes on both sides of the range, and sea-coast which itself is varied with cliffs, sand-dunes and mud-flats. The ten districts are, as usual, divided by the main water-partings, with the exception of No. 5, which is separated from 3 and 4 by the River Parret, a happy arrangement, making the districts more uniform in size and comparable with Watson's vice-counties 6 and 7 which are divided by the same river. An excellent map makes the plan clear. A "table showing the distribution of species within the county," and taking up thirty pages, immediately precedes the actual Flora.

Passing now to the main part of the work, it is noticed that the sequence is usually that of the *London Catalogue*, ed. ix. Synonyms are few, and are included in the index in italics. The usual information as to nativity, habitat, &c., precedes the localities, special attention being given to the local names of well-known species. Localities are classified under their district numbers, and are followed by the name of their recorder, or the work or herbarium from which the record comes. Those followed by no name are on the responsibility of the author, and their large number is the best witness of his intimate knowledge of his subject. More dates might have been given with advantage, particularly as no list of contributors with approximate dates is appended. It should be remarked that Jenyns and L. Blomefield, both frequently mentioned, are one and the same person, *viz.* Rev. L. Jenyns, afterwards Jenyns Blomefield. The localities are followed by a full geographical note on local and general range, which should be studied by any who take an interest in the foreign relations of our flora, for the author is especially well equipped by his personal knowledge of the floras of Portugal, the Canaries, and Madeira, for dealing with this branch of his subject in a county yielding so many Atlantic species.

A few points of more than usual interest may be indicated. In the Addenda are given in full Mr. Linton's reasons for applying the name *Thalictrum montanum* Wallr. to the Cheddar plant. It should be noticed that Mr. Murray considers *Viola* *arvensis* a colonist, after comparing its condition in Somerset with that in Teneriffe, where it grows in turf amid the indigenous vegetation. The distribution of *Ulex nanus*, given entirely on the author's authority, is a valuable addition to our knowledge of its range in the south-western counties. It is pointed out that the name *Prunus fruticans*, now applied by Dr. Focke to a rare hybrid (*P. insititia* × *spinosa*), must be used more carefully in England than hitherto. Four localities are recorded for *Apium nodiflorum* var. *repens*, but should not these be referred to the much commoner var. *ocreatum*, so often mistaken for the first. "The claim of *Senecio saracenicus* to be considered native rests on exactly the same evidence as that of *Aconitum Napellus*." This remark should be compared with DeCandolle's opinion that, considering their range and history, the former should be admitted as a native, the latter an introduction, thus differing even more than Mr. Murray from the views expressed in the *London Catalogue*. A possible difference between our blue pimpernel and *Anagallis cærulea* Schreb. is suggested by the greater distinctness of the latter from *A. arvensis* in S. Europe and Teneriffe, both in form and in range. It is satisfactory to see the query before *S. ambigua* Sm. as a synonym for *Stachys palustris* × *sylvestris*. Smith's plant was described and figured from a form plentiful in potato-fields in Orkney, and was doubtless one of the dry-ground conditions of *S. palustris*. No mention is made of Babington's *Atriplex microsperma*, found near Bath and described by him in his monograph of the British *Atripliceæ*. An interesting history of *Euphorbia pilosa* (which still survives in its one British station near Bath) will be found on page 295. *Elodea canadensis* in Somerset, as elsewhere, appears to be decreasing again. Mr. White's note on an intermediate between *Juncus compressus* and *Gerardi* is here put into print for the third time. A new variety of *Potamogeton pusillus*, submitted to Mr. A. Bennett from Baltonsborough, was called by him *pseudo-trichoides*. The same authority has pronounced a grass from Pensford to be *Glyceria plicata* var. *subspicata* Parnell.

The list of *Rubi*, extending to twenty-four pages, must be the subject of special congratulation to the author. The frequently occurring names of Focke, Moyle Rogers, and Linton are a sufficient guarantee of its excellence, and the great number of localities supplied by Mr. White and Mr. Fry attest the energy of local rubologists. The Willows, arranged according to Dr. Buchanan White's plan, are well worked out. The records, too, of the *Carices* are unusually complete and, being largely due to the author's unaided work, bear witness to his long-continued researches in the county.

A few points present themselves for criticism. The nomenclature usually accepted by British writers seems to have been needlessly discarded. No less than eight genera (including *Ficaria* and *Elodes*) now generally disused will be found in the first sixty pages. The same reactionary tendency is shown in the author's protests against the usual systematic position of *Parnassia* and *Empetrum*. Changes in specific names are numerous, some of them certainly necessary on grounds of priority. Numerous errors of omission and commission occur with regard to capitals at the beginning of specific names; *Lathyrus aphaca*, *L. nissolia*, *Prunus cerasus*, *P. avium*, *P. padus*, *Pyrus aria*, and *P. aucuparia* are, unfortunately, only a few cases out of many; *Brassica Nigra* and *Lepigonum Salinum* appear. What is "*Montia fontinalis*, L."?

To turn to another subject, Mr. Murray seems to have taken great pains to weigh the claims of many species to the names of native, colonist, &c., but inconsistently admits others on evidence as slender as the former is complete. It seems rash to include as natives, *Galium erectum*, from a single locality on a wall; *Silene conica*, a few plants on Minehead Warren; *Chenopodium ficifolium*, occurring very rarely in cultivated and waste ground. All three are reported from other counties under similar conditions as undoubtedly introduced. There may be some little doubt about these, but what must be said of *Lythrum Hyssopifolia?* This is entered as native. "In July, 1882, two plants of this species appeared in my garden at Baltonsborough, on gravel which had been brought from Wells a few months previously"! Again, some extinctions are included in the list, some excluded, and one casual (*Lolium temulentum*) is admitted.

Such slight imperfections cannot be said to mar the usefulness of this excellent work, and Mr. Murray deserves the gratitude of all British, and especially West-country botanists, for placing at their disposal one more really first-class County Flora.

S. T. Dunn.

Investigations into Applied Nature. By William Wilson, Junior. London: Simpkins. 1896. 8vo, pp. viii, 143.

This little book has been sent us to review, but we regretfully acknowledge our incapacity to do this. The following extracts give some idea of its contents, and may perhaps explain our inability to deal with it.

"Perhaps there is no part of botanic investigation that has been so little written upon as our indigenous flora as food-plants. This, I have no doubt, is owing to the fact that most of our leading botanists are not constantly in the midst of field observations, but only having occasional rambles in rural or mountainous districts, whose collections have been carefully arranged according to natural structure. The physiology has been carefully investigated, while their life-history and natural uses remain almost unrecorded, their medicinal properties excepted, if they come within the bounds of natural uses." (Page 1.)

"It is most remarkable what I have observed cattle eating greedily, such as Creeping Ivy, which one would think not very agreeable, Laburnum leaves, and so on, while it is as remarkable what they refuse. And this is the proof that they know by instinct what to eat and what to refuse. I am not alone in this view, as Prof. C. C. Babington, of Cambridge University, told me he had seen them scraping on the grass fields and looking about them in such a way as he was convinced that they were looking for what nature would have given them, but which humanity had denied them. I will only add that this is the result of my observations (I mean I have the same views on the subject)." (Page 13.)

"Fungi appear most abundant on the stems and leaves of herbaceous plants after they decay, and most wood has them when turned into a semi-putrid state; and why should not the potato fungi be a production which is brought about by the effect of disastrous conditions on the potato plant, and not the real origin of the potato disease?" (Page 68.)

"At one time in our world's history mankind were pleased to look upon the globe as just having always been much in the same shape as it then was, and that it would always remain much the same. By and bye it became recognized that the world had passed through many changes, and the study of such changes came to reach the dignity of a science, and it was called Geology." (Page 104.)

Diseases of Plants induced by Cryptogamic Parasites. By Dr. Karl Freiherr von Tubeuf. English Edition by William G. Smith, B.Sc., Ph.D. London: Longmans. 1897. Pp. xvi, 598; figs. 330. Price 18s. net.

In the first place it is to be hoped that nothing will ever induce the translator of this book to announce himself as "W. G. Smith." He properly styles himself "William G.," and all whom it may concern may as well take notice that in the subject of diseases of plants, as in another more momentous sport, there is but one "W. G." It is an encouraging sign of the progress of Botany that translations from the German have now to be justified. Time was when translators were at large seeking what German handbook they might devour, with the expectation of applause. Now we are so conceited that we look for a prefatory justification to anything originally made in Germany. Dr. Smith, however, has rightly judged that Tubeuf's *Diseases* would meet with no vexatious quarantine, but find a ready welcome in this country and in America. Until the original book appeared we had no good general textbook treating of plant pathology. We had good books on plant-diseases, such as the admirable Frank, Sorauer, Hartig's *Baumkrankheiten*, &c., giving us the life-histories of fungal parasites, with details here and there of their influence on their hosts, but no really scientific dealing with the whole matter—no pathology, in short. It is the special merit of Tubeuf that, following in the steps of De Bary, Wakker, and others, he observed this great gap in botanical literature, and set himself to produce a book that should fill it.

In the first part he devotes chapters to fungal parasites and saprophytes, *i.e.* to a consideration of the limitations of the states of parasitism and of saprophytism, to the reaction of the host to parasitic attack, to the relation of the parasite to the substratum, to the subject of infection in general and the disposition of plants to disease, to symbiosis and to the consideration of preventive measures, and other economic matters. That, though not quite following the order of treatment, should be good news to those readers who have not made acquaintance with the original. The second part deals with the parasites according to systematic order, including pathogenic organisms from among the Mycetozoa—of which the greater part concerns that doubtful mycetozoon *Phasmodiophora*—the Bacteria, and the Algæ.

It is only human to have a distrust of translations which are not only translated, but edited. The process is generally inexcusable, and it often means merely that the translator is "too big for his boots." Dr. Smith has made a number of additions of a useful, hardworking, conscientious, and unobtrusive character, for the most part carefully indicated by "(Edit.)"; he has thereby distinctly added to the serviceableness of the book, and deserves credit—but all the same he would have done as well not to give it the bad name of being edited. If these additions had been "notes by the translator," praise would have naturally flowed out to him for his judgment—the state of being *edited*, claims credit and challenges criticism at once. However, let us be blind to such minor considerations. He has done his work all through remarkably well, and has laid many botanists under an obligation to him for a real service rendered with care and judgment.

G. M.

Analytic Keys to the Genera and Species of North American Mosses. By C. R. BARNES & F. D. HEALD. Madison, Wis. Dec. 1896. Pp. x, 212. Price 1 dollar.

THIS work will be found in vol. i. of the *Bulletin* (Science Series) of the University of Wisconsin, and as it is of a supplementary nature, its bibliographical position may be most easily ascertained if we take a brief survey of the history of the study of Mosses in the United States.

It was more than forty years ago that Sullivant, the leading bryologist in his country, having made a name for himself in connection with the Mosses of the Eastern States, began to entertain the notion of compiling a Manual of the Moss-flora of the whole continent, and to collect and investigate the requisite material, Lesquereux assisting him in the work. He described a large number of new species in his beautifully illustrated *Icones Muscorum* and elsewhere; but before he could realize his purpose he died in 1873. Lesquereux then essayed to complete his late colleague's task, and, being incapacitated by the failure of his sight, secured the assistance of T. P. James. The work was well-nigh finished in 1882, when James died. With Renauld's help the remaining determinations were made; and at last Lesquereux & James's *Manual of the Mosses of North America* (Boston, 1884) was passed through the press under the editorship of Sereno Watson, a competent botanist, but one that lacked the special qualifications of a bryologist. Under the circumstances it is not surprising that artificial keys to the genera and species found no place in the *Manual*. This regrettable omission has been made good by Prof. Barnes, who in 1886 issued a key to the genera, and in 1890 keys to the genera and species (as was mentioned in this Journal for 1890, p. 380); but now he has with Mr. Heald's aid rendered a much greater service in supplementing the revised and extended *Keys* with a large Appendix containing 603 descriptions of all the species and varieties which have been added to the North American Moss-flora since the publication of the *Manual* up to the end of 1895. During that period large collections from the States and from Canada have been worked over by European bryologists—Renauld and Cardot, and Kindberg. The abundance of the new species with which Kindberg embellished his Canadian *Catalogue* (1892) has awakened loud protests in the States, and some of them (*e.g.* seventeen out of eighteen in the genus *Dicranum*) have already been reduced. Hence the *Manual* when revised and brought up to date will not receive by any means so large an addition to its 900 species as seemed likely at the time when Kindberg's *Catalogue* was fresh from the printer's hands.

The *Keys* are cleverly planned; and as they facilitate the use of the *Manual*, while the Appendix puts within everyone's reach descriptions of the species which are not in the *Manual*, it is to be hoped that more Americans will be induced to take an interest in mosses, and that a wider study of the subject will lead (as Prof. Barnes says) to a more accurate knowledge of the distribution and variability of the species, in time to allow the ill-founded species to be weeded out before the publication of the next edition of the *Manual*.

A. G.

ARTICLES IN JOURNALS.[*]

Annals of Botany (March). — M. A. Brannon, 'Structure and Development of *Grinnellia americana*' (4 pl.). — H. M. Richards, 'Evolution of Heat by wounded Plants.' — A. C. Seward, '*Lyginodendron*' (2 pl.).—P. Magnus, 'Some Species of *Urophlyctis*' (2 pl.). —R. Chodat, 'Polymorphism of Green Algæ.' — R. J. H. Gibson, 'Anatomy of *Selaginella*' (1 pl.). — D. H. Scott, '*Cheirostrobus*, a new type of fossil cone from calciferous sandstones.' — W. T. T. Dyer, 'Note on discovery of *Mycorhiza*.'

Bot. Centralblatt (Nos. 9–12).—W. Grevel, 'Anatomische Untersuchungen über die Familie der *Diapensiaceæ*' (1 pl.). — (No. 10). J. Wiesner, 'Ueber die photometrische Bestimmung heliotropischer Constanten.'—(No. 11). A. J. J. Vandevelde, 'Ueber den Einfluss der chemischen Reagentien und des Lichtes auf die Keimung der Samen.'

Bot. Gazette (Feb.). — 'Opportunities for Research in Botany offered by American Institutions.' — J. E. Tilden, 'New species of Minnesota Algæ' (3 pl.).—G. T. Moore, jun., '*Uroglena americana*'

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[*] The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

(1 pl.). — T. Holm, '*Hypoxis erecta*' (1 pl.). — E. J. Hill, '*Zizia aurea & Thaspium aureum.*' — L. F. Henderson, *Isoetes Underwoodii*, sp. n.

Bot. Zeitung (March 16). — H. Molisch, 'Der Einfluss des Bodens auf die Blüthenfarbe der Hortensien.'

Bull. de l'Herb. Boissier (Feb.).—F. Fœrster, *Bellevalia Freynii*, sp. n. — D. Prain, *Onobrychis Bellerii*, sp. n. (1 pl.).—F. Stephani, 'Hepaticæ Japonicæ.' — F. Kränzlin, 'Orchidaceæ novæ.' — F. Crépin, 'Roses recueillies en Thessalie.' — (March). A. Chabert, 'Sur la disparition de quelques plantes en Savoie.' — F. Crépin, 'La question de la priorité des noms spécifiques envisagée au point de vue du genre *Rosa*. — C. Winkler & J. Bornmüller, 'Neue Cousinien des Orients' (1 pl.).—C. Müller, 'Bryologia Guatemalensis.'

Bull. Torrey Bot. Club (Feb. 28). — J. K. Small, 'Shrubs and Trees of the Southern States.' — F. L. Harvey, 'Myxogasters and Gasteromycetes of Maine.' — A. Schneider, 'Biological Status of Lichens.' — H. H. Rusby, 'Affinities of *Dendrobangia*' (1 pl.).— L. M. Underwood, 'New Alabama Fungi.'—E. P. Bicknell, *Lechea juniperina*, sp. n. — P. A. Rydberg, *Lonicera glaucescens & Geum turbinatum.* — N. L. Britton, *Viola atlantica & Geranium Bicknellii*, spp. nn.—A. A. Heller, *Ribes leucoderme*, sp. n.

Erythea (Feb. 26). — A. J. Merritt, 'Pollination of Californian mountain flowers' (cont.).—J. G. Lemmon, 'West American Coniferæ' (cont.).

Gardeners' Chronicle (Feb. 27). — C. T. Druery, 'Variation and Environment.'—(March 13). W. Watson, 'Polycarpic Agaves.'— (March 20). F. Kränzlin, *Eulophiella Peetersiana*, sp. n.

Journal de Botanique (Jan. 16). — A. Franchet, 'Compositæ novæ e Flora Sinensi.' — (Jan. 16, Feb. 16). C. Sauvageau, 'La sexualité de Phéosporées.' — (Jan. 16, Feb. 1). E. Bonnet, 'Le Haricot avant la découverte de l'Amérique.' — (Feb. 1). P. van Tieghem, 'Les poils post-staminaux des Santalacées.' — A. de Coincy, 'Plantes nouvelles de la flore d'Espagne.' — (Feb. 1, 16). E. Drake del Castillo, 'Les Araliées des îles de l'Afrique occidentale.' — (Feb. 16). 'Une lettre d'Alphonse de Candolle' (on nomenclature).—(March 1). G. Rouy, 'Observations sur quelques Malvacées.' — C. Sauvageau, 'Sur les Antheridies du *Taonia atomaria*.' — L. Lutz, 'Recherches sur la gommose de l'*Aralia spinosa*.' — E. Malinvaud, 'Un *Stachys* hybride.' — (Mar. 1, 16). E. Bescherelle, '*Leucobryum minus*.' — —. Nadeaud, 'Quelques plantes rares du Tahiti.'

Oesterr. Bot. Zeitschrift (March). — E. Hackel, '*Bifaria*, eine neue Section der Gattung *Panicum*.' — J. Bornmüller, '*Calamagrostis halesarensis* Torg. & Bornm., sp. n.' — F. Matouschek, 'Bryologisch-floristische Beiträge aus Böhmen' (cont.). — E. v. Halácsy, 'Florula Sporadum' (cont.).

BOOK-NOTES, NEWS, &c.

The Foreign Office has issued a Report on the Botanical Aspects of British Central Africa by Mr. Alexander Whyte, which, however, is confined to the economic side of the subject. "The publication was retarded owing to its needing careful revision at Kew Gardens." *Widdringtonia Whytei*, the "Mlanje cedar," is becoming of considerable commercial importance; this, it will be remembered, was described by Mr. Rendle in the paper on Mr. Whyte's Mlanje collection in the Linnean *Transactions*. It is hardly accurate, by the way, to say that that collection was "worked out by Mr. Carruthers," although the prefatory note was communicated by him.

We have just received the Report of the Belfast Naturalists' Field Club for 1894–95, which contains an important supplement, extending over a hundred pages, to the *Flora of North-East Ireland*, compiled by Messrs. S. A. Stewart & R. Lloyd Praeger. Numerous additions are made both to the flowering plants and cryptogams; with regard to the latter further amplification may be expected when Templeton's MS. "Flora Hibernica" has been carefully gone through. This Supplement is thoughtfully printed uniformly with the *Flora*, which makes it very convenient for reference. We are sorry, however, to see Robert Brown's localities for *Erodium moschatum* called in question. The authors say it has not been found in either station by any recent observer, which is not remarkable in the case of a plant so uncertain in appearance, and add "it seems probable" that Brown mistook *E. cicutarium* for it. Apart from the improbability of a botanist of Brown's stamp making such a blunder, his full description in the MS. volume whence the localities are derived renders such a view untenable.

At a meeting of the Royal Botanic Society on Feb. 27th, a paper was read by Mr. W. C. Martindale "On the Desirability of establishing an Institute for the Teaching of Botany in the Royal Botanic Gardens," which has since been issued in pamphlet form. "The opportunity afforded by a renewal of the lease of the Gardens" has suggested the desirability of further educational work on the part of the Society; and Mr. Martindale's proposal was supported by Dr. Scott, Prof. Frank Oliver, and others. Apart from the setting aside any portion of a public park for the benefit of a special class of the community, which we cannot regard as desirable, there is much to be said in favour of the continued existence of the Society's Gardens, which have rendered important help to the London teachers of botany.

The Rev. Robert Hunter, M.A., LL.D., died on Feb. 25th at his residence, Forest Retreat, Epping Forest, in his seventy-fourth year. He graduated in Arts in Aberdeen University, and then studied theology at the New College, Edinburgh. On completing his studies he went as a missionary of the Free Church of Scotland to Nagpur, India. For some time after his return he resided in Edinburgh, and afterwards came to London. The great work of his life was *The Encyclopædic Dictionary*, to which he devoted seventeen years' unremitting labour. Although not a botanist, Dr. Hunter was interested in plants. During a visit to Bermuda, in 1884, he made a small collection, and he published a list of Bermudian ferns in this Journal for 1877 (p. 367, where the date is uniformly misprinted 1864). His plants, among which was the endemic *Erigeron Darrellianus*, are in the Botanical Department of the British Museum.

Mr. Nathaniel Colgan contributes to the *Journal of the Proceedings* of the Royal Society of Antiquaries in Ireland (vol. vi. pt. 4, pp. 211–226, 349–361) a valuable and interesting paper entitled "The Shamrock in Literature; a critical chronology."

At the meeting of the Linnean Society on March 4th, Mr. W. Carruthers exhibited, with the aid of lantern-slides, a series of portraits of Linnæus, and gave some account of the history of each. In the course of a tour which he had made in Sweden and Holland, he had been fortunate enough not only to see the original paintings, but also to obtain photographs of them, so that he was now able to exhibit exact copies. Putting aside "supposed portraits," and such as might be termed "fancy portraits" having no claim to authenticity, he had satisfied himself of the existence of eight that were certainly painted or drawn from life, and had been copied more or less frequently by different engravers. The earliest of these was painted by Hoffman in 1737, while Linnæus was working for his patron Cliffort at Hartecamp, and represents him at the age of thirty in the picturesque dress in which he travelled through Lapland. Of the next portrait, an engraving by Ehrensverd in 1740, no original is known to exist. In 1747, at the age of forty, two pencil sketches of Linnæus, one being a full length, were made by Rehn; and five years later a beautiful pastel was executed by Lundberg. Scheffel in 1755 painted him at the age of forty-eight; and this portrait is preserved at Hammarby in the house of Linnæus, now public property under the care of Prof. Fries of Upsala. Then came the medallion by Inlander, executed in 1773, of which a copy (one of three) is in the possession of this Society. The following year, when Linnæus was sixty-seven years of age, his portrait was painted by Krafft, and was placed originally in the Medical College of Stockholm, of which Linnæus was one of the founders. It was supposed to be lost, but had been removed to the Royal Academy of Sciences in Stockholm, where Mr. Carruthers discovered it. The latest portrait was that by Roslin, painted in 1775, when Linnæus was in his sixty-eighth year. A fine copy of this by Pasch, presented to Sir Joseph Banks, and given by him to Robert Brown, now hangs in the Society's Library.

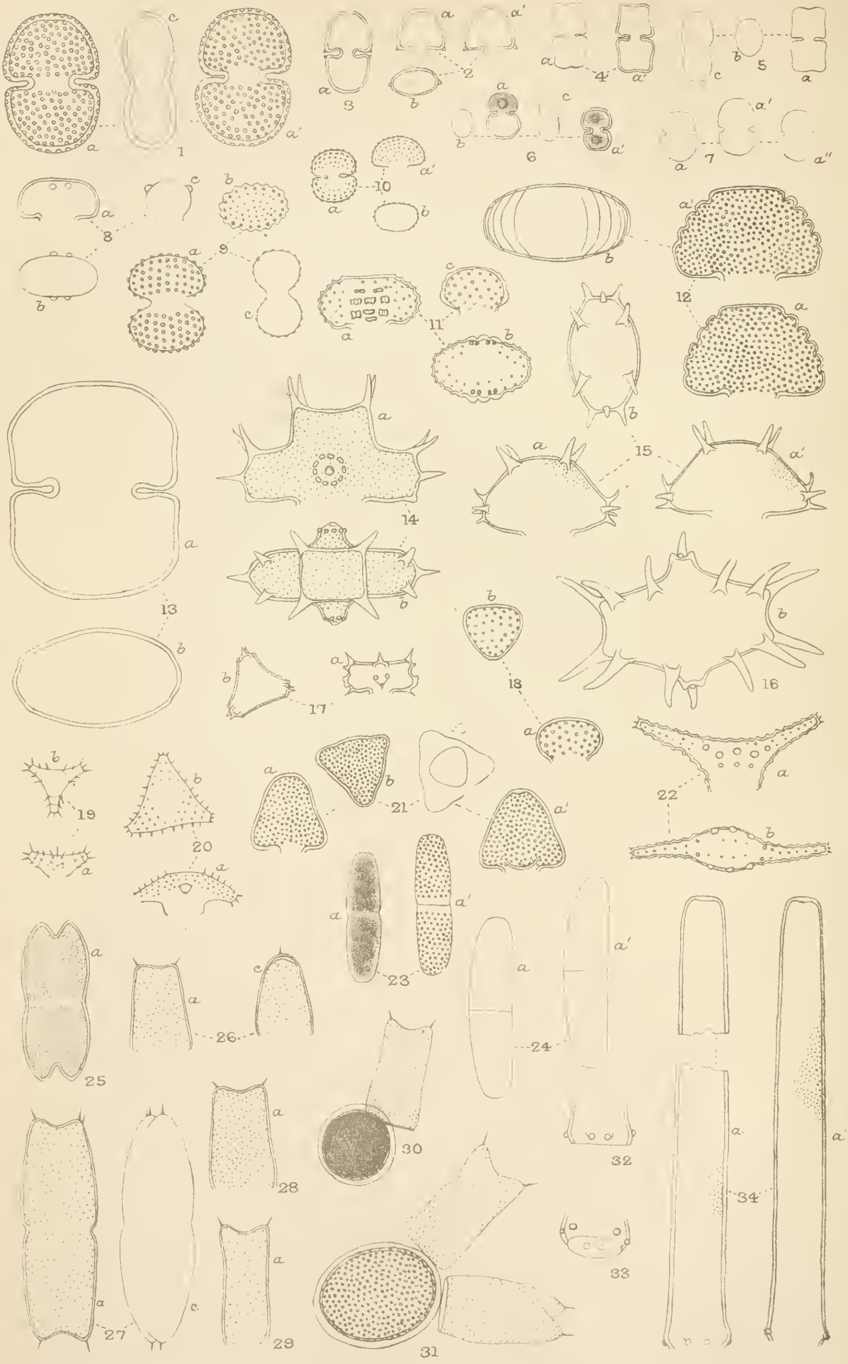
We understand that the incompleteness of the enumeration of Kew publications noticed on pp. 100–103 has been discovered to be so serious that a supplementary list is in course of preparation. Among the works left out may be named Hooker and Baker's *Synopsis Filicum*, Mr. Baker's monographs of *Ampelideæ* and *Connaraceæ* in the *Flora Brasiliensis*, his *Refugium Botanicum*, some of his important contributions to the *Gardeners' Chronicle* (such as the papers on Hellebores and Yuccas), and many more. The numerous errors of commission and omission render the List of Kew Publications almost as remarkable as the celebrated Seed-list for 1885. But that was at least funny!

The Supplementary Fascicle to the Set of British Rubi, which has just been issued, contains specimens of seven plants which have been named and described in this Journal since the issue of the Set began in 1892. So far as is known at present, these are endemic. They are the following:—*R. Silurum*, described as a variety of *R. nemoralis* P. J. Muell.; *R. curvidens* as a species, and *R. virgultorum* as a variety of *R. Borreri* Bell-Salt., by the Rev. Augustin Ley in *Journ. Bot.* 1894, 142–144; *R. bracteatus* described as a variety of *R. mercicus* Bagnall by Mr. J. E. Bagnall, *l. c.* 1894, 187; *R. clivicola* as a variety of *R. argentatus* P. J. Muell. by Rev. A. Ley, *l. c.* 1896, 158; and *R. rubriflorus* as a species by the Rev. W. H. Purchas, *l. c.* 1894, 139, 187. The last-named is issued as it appears in the ninth edition of the *London Catalogue*, as a variety of *R. dumetorum* W. & N. *R. villicaulis* Koehl. (an abundant plant in Scotland, which also occurs in some Welsh and English counties) seems to be indistinguishable from *R. insularis* Aresch. *Skänes Fl.* ed. 2. On this Dr. Focke notes:—"The form called *R. insularis* Aresch. is the true typical *R. villicaulis*, first described from Silesia, E. Germany. The common form of N. Germany is much more like English *R. calvatus*." The Rev. Augustin Ley has taken the place of the Rev. R. P. Murray, being a large contributor to the set generally, and in particular to this fascicle, Mr. Murray having been absent from England when the fascicle was set on foot.

Mr. Schlechter, writing from Cape Town on March 8th, records his second visit to the Cold Bokkeveld, which, in spite of the extreme drought under which it has been suffering, proves to be a very rich place botanically. On his first visit, Mr. Schlechter's collecting was confined to the plains, as the high mountains were partly covered with snow. He has now, however, ascended most of the highest peaks, some of which are above 6000 ft., and has obtained a large number of novelties.

M. E. Rolland, whose *Faune Populaire* has become a classic among folklorists, has issued the first part of a companion work which will do for the vegetable what the former has done for the animal kingdom. Its full title is "Flore Populaire, ou Histoire Naturelle des Plantes dans leurs rapports avec la Linguistique et le Folklore." We hope to notice it in an early issue.

Tab. 368.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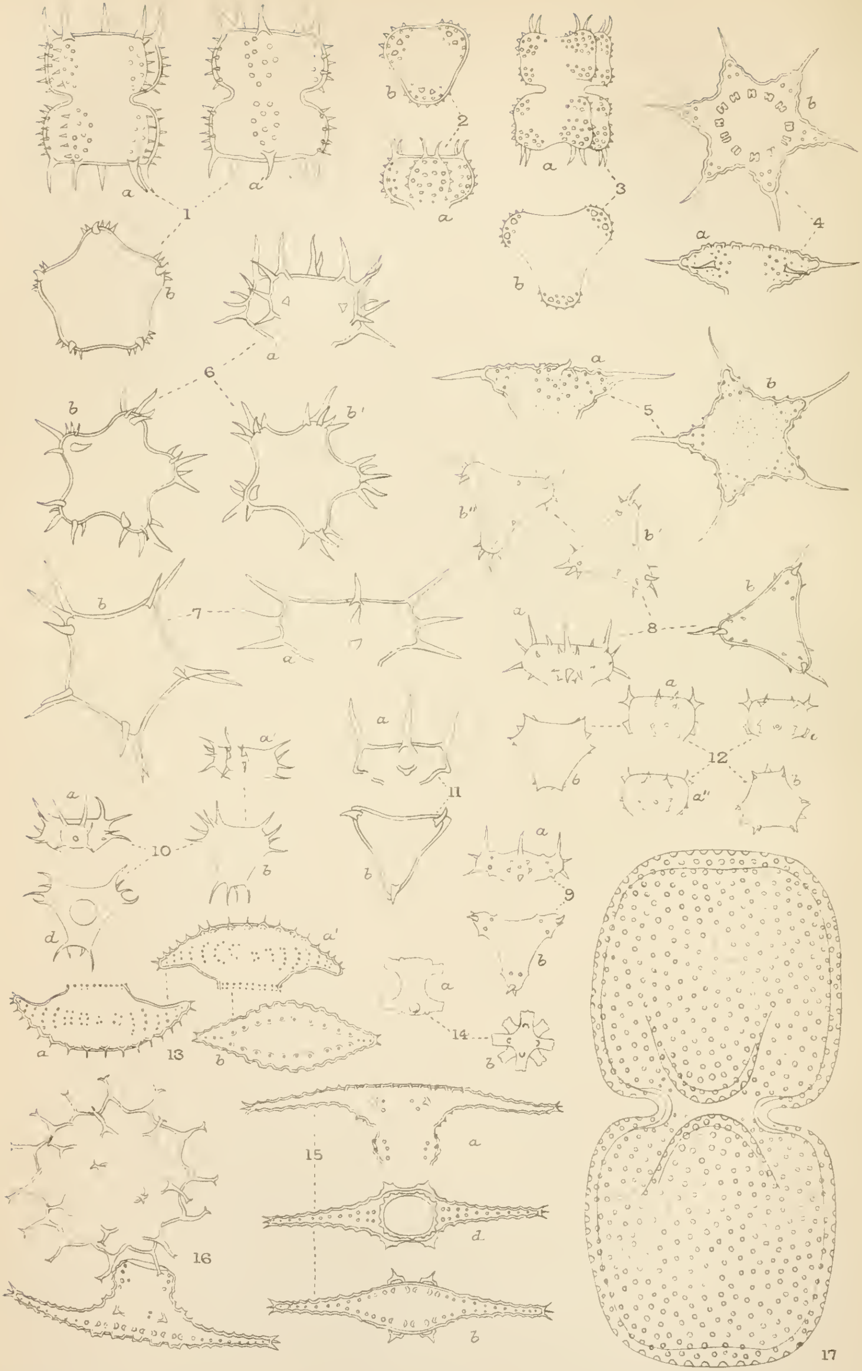
G.S West ad nat. del.
R.Morgan lith.

West, Newman imp.

African Algæ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G.S. West ad nat del
P. Morgan lith.

West, Newman imp

African Algæ.

The CAMEL FODDER-PLANTS of WESTERN AUSTRALIA.

By Spencer le M. Moore, F.L.S.

The present paper is the result of some observations made by the writer while travelling recently with a small camel-train in the interior of Western Australia. As it is proposed to publish at a later date the botanical results of the journey, it is hoped that a few cursory remarks bearing on the special character of the paper will be deemed sufficient on the present occasion. The route taken was from the mining township of Southern Cross, situated in the Yilgarn goldfield, and about 250 miles west from Perth; thence north-east to Wangine or Siberia Soak; from there almost due east to Goongarrie or Ninety-Mile, and onwards in a north-easterly direction to Mount Margaret, on the shore of the great salt lake known as Lake Carey. The country between Lake Carey and Coolgardie was then traversed to and fro, after which, on a general north-north-west bearing from Lake Carey, Lake Darlôt was reached, and Coolgardie again arrived at *via* Mount Malcolm and Goongarrie. After this the camels were retained for some time in the neighbourhood of Coolgardie on its south-west side.

It must suffice here to mention that the ground passed over consists of breadths of unauriferous alternating with auriferous country. The former is largely composed of conglomerates and of granites and gneisses which have undergone more or less metamorphism; the latter of schists of various kinds, with outcrops of quartz, diorite, and ironstone. The granite and gneiss very frequently appear in the form of huge outcropping masses many acres in extent, the irregular surfaces of which have been worn into shallow pans—the so-called gnamma-holes—which hold water after rain, and it is usually at the foot of such masses that the "soaks" are dug. Some of these soaks, when the water-catch is a good one, contain water long after the rain has fallen; some even, in spite of the serious drain to which they have of recent years been submitted by prospectors and teamsters, may still be described as almost perennial sources of the precious fluid. It is almost exclusively in the immediate neighbourhood of these gnamma-rocks and during the cool weather, or in low-lying places in springtime where the soil has retained some of its moisture, as well as along the banks or in the bed of creeks after heavy rain, that the lusher types of vegetation are found. Elsewhere the flora is of purely Australian type, by far the greater part of it having some means by which transpiration is hindered, such as phyllodes, or leaves oriented in the manner of phyllodes, essential oils or resins, stomata in pits, woolly covering, &c. And this is no matter for wonder, bearing in mind the small rainfall characteristic of the interior of the colony.

It must be understood that the following list is not to be regarded as by any means an exhaustive one. Thus, to take only one instance—the various species of *Acacia* are probably all more or less nutritive, but only a few of them find a place here. Having other duties to perform, it was quite impossible for me to follow the hobbled camels about, and note whatever they happened to be browsing upon; so that, although many opportunities were given of studying the subject, there can be no doubt but that many plants well suited to serve as fodder for camels have been overlooked. With this proviso the list may now be given.

Cruciferæ.

1. *Blennodia brevipes* F. Muell. Near Coolgardie, Aug.

2. *B. cardaminoides* F. Muell. var. microcarpa (nob.). Near Coolgardie, Aug. A lowly variety, with small siliquas only 4–6 mm. in length.

3. *Alyssum linifolium* Steph. Environs of Coolgardie, Aug. A very small form, 1–2 in. high.

4. **Menkea coolgardiensis**, sp. nov. Repens, sparsim foliosa, foliis lobatis deorsum cuneatis petiolatis, caulinis summis subsessilibus, floribus parvis nec minutis, petalis albis, stylo brevissimo in fructu stigma æquante, siliculis oblongis compressis pedicellum gracilem æquantibus vel eo paullo brevioribus.

Hab. Prope Coolgardie mens. Aug. floret.

Herba sparsim puberula habitu *M. australis* Lehm. Rami repentes vix spithamei, graciles. Folia oblonga vel lineari-oblonga, 1–4-lobata, summa nonnunquam integra vel subintegra, obtusissima, radicalia vix usque 2·0 cm. long., petiolis tenuibus 0·5 cm. vel paullo longioribus fulta; caulina 0·5–1·0 cm. long. Racemi elongati, pluriflori. Pedicelli mox alabastra breviter excedentes, sub floribus usque ad 0·3 cm. long., ascendentes vel patentes. Flores expansi vix 0·3 cm. diam. Sepala oblonga, obtusa, 0·15–0·2 cm. long., ætate deflexa et diu persistentia. Petala anguste oblonga, obtusa, 0·15 cm. long. Stamina 6; antheræ luteæ, ovatæ, filamentis deorsum dilatatis multo breviores. Ovarium late ovatum, stigmate comparate magno subsessili coronatum. Siliculæ basi breviter angustatæ, 0·4 cm. long., vix 0·2 cm. lat. Semina parva, purpureo-brunnea, funiculis gracillimis persistentibus more generis fulta.

Nearest to *M. australis* Lehm., of which it has the habit. It differs from that species chiefly in the much larger flowers with their persistent reflexed sepals, as well as in the differently shaped silicules. I have not seen *M. sphærocarpa* F. Muell., but I cannot make the present plant fit in with Mueller's description of the other, although both agree in having persistent reflexed sepals. Judging from the description, *M. sphærocarpa* has quite different silicules, and moreover its leaves are said to be toothed merely, its sepals ovate, and its petals rotund and clawed.

5. *Lepidium ruderale* L. Near Coolgardie, Aug.

6. *L. papillosum* F. Muell. Near Coolgardie, Aug. A small form not exceeding 9 cm. in height, and often only half that size.

7. *Raphanus sativus* L. Bullabulling, Sept. Seen here only in moist places close to the gnamma-rocks. Most probably introduced, the place having served for months as a camping ground for teamsters. The plants of this order are to be found only for a few

weeks in springtime, and in low-lying places where a certain amount of moisture has been retained during the cold weather. They are characterized by their small size, as compared with specimens growing near the coast. They are all excellent fodder-plants.

PITTOSPOREÆ.

8. *Pittosporum phillyræoides* DC. var. MICROCARPA (nob.). Saltbush plain, south of Doyle's Well, near Mt. Malcolm. Differs from the type in its small oblong-ovoid not flattened fruits, which have only 1–4 seeds. The flowers also are white, instead of yellow, as in the type. This plant, called "Willow-bush" by prospectors, is greedily eaten by camels, who thrive well upon it.

CARYOPHYLLEÆ.

9. *Drymaria filiformis* Bth. Near Coolgardie, Aug. A small plant, abundant in some places in the spring. A good fodder.

PORTULACEÆ.

10. *Calandrinia calyptrata* Hook. f. A rather common little herb in spring in the Coolgardie district. The specimens are usually very small, not more than 1–2 in. high, though specimens may reach 5 or 6 in.

STERCULIACEÆ.

11. *Sterculia diversifolia* G. Don. This, the well-known Kurragong tree, is an excellent food for camels. It is found chiefly in the "mulga" bush country north of the Ninety-mile, where its bright green leaves are a refreshing contrast to the sombre vegetation surrounding it. It is rare in the neighbourhood of Coolgardie.

GERANIACEÆ.

12. *Erodium cicutarium* L'Hér.; and 13. *E. cygnorum* Nees. Coolgardie district, Aug. and Sept. Both these are good fodder-plants.

ZYGOPHYLLEÆ.

14. *Zygophyllum apiculatum* F. Muell. Coolgardie district; common in springtime.

15. *Z. iodocarpum* F. Muell. var. *bilobum*. Coolgardie district.

16. *Z. fruticulosum* DC. Near Ninety-mile Lake, June,

17. *Z. fruticulosum* DC. var. *floribus parvis, albis*. Coolgardie district, spring. I can see no variation from the type except in the case of the flowers of this plant, which certainly are strikingly different, being very small, not more than 5 mm. in diameter, with white petals only some 3 mm. in length. This is perhaps a new species, but as Baron Mueller speaks of a small-flowered variety of *Z. fruticulosum* as among the plants brought back by the Elder expedition, and the flowers are the only peculiarity of my specimens, it is deemed better to abstain from describing. All these Zygophyllums are greedily eaten by camels.

18. *Tribulus terrestris* L. Between Uladdie Soak and Yilgangie claypans, March.

LEGUMINOSÆ.

19. **Mirbelia microphylloides**, sp. nov. Suffrutex erectus spinescens, ramis mox minute et appresse pubescentibus puberulisve, spinis elongatis tenuibus patentibus, foliis circa spinas congestis parvis obovato-oblongis planis, calycis appresse puberuli lobis tubo brevioribus summis alte connatis, vexillo calycem duplo superante, carina alis æquilonga, ovario stipitato villosulo, ovulis 4.

Hab. Viget prope Coolgardie ubi repperi mens. Aug. florentem.

Circiter metralis. Radix haud visus. Rami leviter angulati necnon striati. Spinæ rectæ vel leviter decurvæ, deorsum ampliatæ e pulvinis parvis fusco-pubescentibus exeuntibus, 0·5–1·0 cm. long. Folia subsessilia, obscure mucronulata, pleraque circa 0·4 cm. long. et 0·15–0·2 cm. lat. Flores breviter pedunculati, lutei, rubro infusi. Calyx totus 0·4 cm. long.; lobi ejus anteriores parvi, circa 0·1 cm. long., triangulares, subacuti; lobi posteriores deltoidei, tertia pro parte liberi. Vexillum rotundatum, leviter emarginatum, vix 0·6 cm. long. et lat. Carina alæque 0·55 cm. long., longe unguiculati. Ovarium lineari-oblongum, stipite vix eum semiæquante suffultum. Stylus sat pinguis, ipso sub stigmate subito curvatus. Legumen non vidi.

The affinity of this plant is undoubtedly with *M. spinosa* Bth., *M. microphylla* Bth., and *M. multicaulis* Bth. The first of these has linear leaves with revolute margins, its calyx-lobes are much longer and acuminate, the standard is wider than broad, and the keel markedly shorter than the wings; it also has a sessile glabrous ovary with from 6 to 8 ovules. The other two species agree with the one now described in having leaves without revolute margins, and a stipitate ovary, but the leaves of *M. microphylla* are different in shape, and there are various floral divergences, including the complete union of the upper calyx-lobes, the relatively shorter keel, and glabrous ovary with 6–8 ovules. The leaves of *M. multicaulis* also are somewhat different, as also are the calyx and corolla; moreover, the ovary has 12–15 ovules, as compared with the 4 of the present plant. I should not like to say that this is a really good food for camels, inasmuch as the *Podaliriæ* generally are liable to suspicion. I only know that our camels ate it, and apparently without any ill effects.

20. *Medicago denticulata* Willd. Bullabulling, close to the rocks, Sept. Doubtless introduced, and most probably by teamsters.

21. *Acacia erinacea* Bth. Near Coolgardie, Aug.

22. *A. acuminata* Bth. Bullabulling, Sept. This is the largest *Acacia* seen upon the goldfields; and is the only real "wattle"—as the term is understood in the eastern colonies—met with up country.

23. *A. subcærulea* Ldl. Near Coolgardie, Aug. As already mentioned, other Acacias of the collection are doubtless eaten by camels, but the fact was not noted by me. It is the lusher species of this genus which are most liked; some are so dry as to be comparatively of little value.

HALORAGEÆ.

24. *Haloragis Gossei* F. Muell. Bullabulling; also near Coolgardie, Aug.

UMBELLIFERÆ.

25. *Daucus brachiatus* Sieb. A small species flourishing with other lowly plants in the early springtime in the Coolgardie district.

FICOIDEÆ.

26. *Mesembryanthemum australe* Ldl. Yilgangie clay-pans, Feb. A very small form, the flowers under 1 in. in diameter. Not a true fodder-plant, being only occasionally touched by camels.

COMPOSITÆ.

27. *Calotis plumulifera* F. Muell. Near Coolgardie, Aug.

28. *Podolepis pallida* Turcz. Abundant on the Bullabulling rocks in Sept. A beautiful yellow everlasting.

29. *Schœnia Cassiniana* Steetz. This very beautiful pink everlasting is common in the Coolgardie district in the spring. It is greatly liked by camels.

30. *Waitzia corymbosa* Wendl. A common everlasting in springtime in the Coolgardie district.

31. *Helipterum rubellum* Bth. Common at Gibraltar and elsewhere near Coolgardie in the spring. There is also a white-flowered variety of this.

32. *H. Haighii* F. Muell. Gibraltar, Sept.

33. *H. strictum* Bth. A small form, at most not more than 9 in. high. Coolgardie district, Sept. to Nov.

34. *H. Fitzgibboni* F. Muell. Rather common in Coolgardie district in springtime. A handsome lowly everlasting, much liked by camels.

35. *H. hyalospermum* F. Muell. Near Coolgardie, Aug.

36. *H. pygmæum* Bth. var. *occidentale*. Near Coolgardie, Aug.

37. *H. Manglesii* F. Muell. This beautiful everlasting is found only on the soil of decomposed granite rock.

38. **H.** (§ PTEROPOGON) **oppositifolium**, sp. nov. Erectum, herbaceum, semispithameum, glabrum, caule simplici vel sparsim ramoso, foliis oppositis rarius ipsis sub capitulis solitariis sessilibus leviter amplexicaulibus lineari-lanceolatis acutis vel acuminatis, capitulis sat parvis late ovoideis solitariis plurifloris, involucri squamis exterioribus late oblongis acutiusculis vel obtusis nonnunquam obtusissimis omnino hyalinis nequaquam rigidis, ceteris lamina brevi ovato integro citrino instructis, flosculis paucibus externis fœmineis hermaphroditis similibus, acheniis villosis, pappi setis 15–20, breviter plumosis.

Hab. Prope Coolgardie floret mens. Sept.

Herba parva, gracilis. Radix usque 3·0 cm. long., tenuis, parce ramosus. Caulis gracilis, strictus, subteres, in longitudinem striatus. Folia pleraque 1·0–1·5 cm. long., et 0·2–0·4 cm. lat.,

in sicco cinerea et erecta, integra, paria infima sepius plus minusve abortiva, omnia glandulis parvis fuscis prædita. Capitula vix 1·0 cm. diam., usque 1·0 cm. long. Involucri squamæ extimæ abbreviatæ, circa 0·3 cm. long.; medianæ extimas duplo excedentes; intimæ 0·7 cm. long. earum lamina petaloidea 0·15–0·25 cm. long., reflexa vel plus minus patens. Flosculi citrini. Corollæ tenues, 0·4 cm. long. Antherarum caudæ tenuissimæ. Achenia oblonga, longe villosa, 0·2 cm. long. Pappi setæ corollas excedentes, 0·5 cm. long., subrigidæ, æqualiter plumulosæ, lacteæ.

This plant is remarkable for its opposite leaves; its affinity would seem to be with *H. strictum* Bth., but, besides the difference in the insertion of the leaves, the heads of the new species are differently shaped, being relatively broader; and they also have a larger number of florets. The involucral bracts, too, are different, and much thinner in consistence; and their petaloid laminæ are yellow, and not white. The tails of the anthers are very slender, so much so that the compound microscope alone can do justice to them.

39. **H.** (§ Pteropogon) **Zacchæus**, sp. nov. Ascendens, pusillum, laxe villosulum, foliis parvis anguste linearibus mucronulatis usque ad capitulas confertis, capitulis parvis subcorymbosis oblongis paucifloris, involucri squamis externis late oblongo-obtusis omnino hyalinis tenuibus, ceteris lamina parva deltoideo-ovata obtusissima integra virescente vel citrino-virescente coronatis, acheniis papillosis, pappi setis 10 acheniis subæquilongis dense plumosis.

Hab. Juxta Coolgardie repperi mens. Aug.

Planta 2·0–2·5 cm. alt., a basi ramosa. Radix macer, simplex, sinuosus, usque 2·0 cm. long. Rami patentes, graciles, una cum foliis præsertim sursum piloso-villosuli. Folia pleraque 0·3–0·4 cm. long., alterna, inferiora interdum subopposita, sessilia. Capitula vix 0·5 cm. long., 0·25–0·3 cm. lat. Involucri squamæ externæ 0·2 cm. long.; medianæ externis duplo longiores. Flosculi 6 aliqui interdum steriles. Corollæ graciles, pappo subæquilongæ. Achenia 0·16 cm. lat., 0·12 cm. long., præter papillas paucas parvas omnino glabra. Pappi setæ albidæ, 0·15 cm. long., æqualiter plumosæ.

A species allied to *H. pygmæum* Bth., of which it has much the habit; but the heads are different in several respects, being relatively broader and much shorter, and the inner involucral scales have greenish and not white tips. Moreover, the achenes of *H. pygmæum* are densely villous, and the pappus-hairs much elongated.

40. *Cephalipterum Drummondii* A. Gray. Common in the Coolgardie district in Aug.

41. *Helichrysum semipapposum* Bth. Gnarlbine Rock, Nov.

42. *Athrixia tenella* Bth. Common near Coolgardie in springtime.

43. *Senecio vulgaris* L. A common weed round Coolgardie in the spring.

44. *S. lautus* Forst. Coolgardie, Aug.

45. *Sonchus oleraceus* L. This, which is a great favourite with camels, is not by any means a common plant. It is usually small in size, and is not seen after the warm weather has set in.

All the above-named *Compositæ* yield excellent forage for camels, and it is in great part to the abundance of this and other lowly herbaceous vegetation during early spring that is to be ascribed the rapidity with which these animals get into condition at that period of the year.

GOODENIACEÆ.

46. *Scævola spinescens* R. Br. A common shrub in the Coolgardie district, of which camels will sometimes eat sparingly.

47. **Goodenia mimuloides,** sp. nov. Herbacea, pilosa, habitu *G. pinnatifidæ* Schlecht., foliis radicalibus longipetiolatis ambitu oblongo-obovatis pinnatifidis, segmentis ovato- vel lineari-oblongis obtusis, caulinis parvis sparsis ovatis integris vel subintegris, pedunculis axillaribus elongatis gracilibus ebracteolatis, calycis lobis oblongo-lanceolatis tubo campanulari subæquilongis integerrimis, corollæ modicæ luteæ extus pubescentis lobis inferioribus latiuscule unilateraliter alatis inferne ciliatis, superioribus æqualiter alatis ultra medium connatis, stylo pubescente, ovario ovato, ovulis magnis quove in loculo 6–7, stigmate brevissime bifido, capsulis haud visis.

Hab. In variis locis juxta Gibraltar floret mens. Sept.

Planta spithamea vel minus, ramis patenti-ascendentibus teretibus striatis. Folia radicalia (petiolis gracilibus inclusis) usque 4·0 cm. long., utrinque piloso-pubescentia, eorum lobi 0·3–0·5 cm. long., 0·2–0·3 cm. lat.; caulina circa 0·5 cm. long., brevipetiolata. Pedunculi 2·5–6·0 cm. long., erecto-patentes, pilosi. Calyx pubescens, circa 0·5 cm. long., 0·25 cm. lat.; lobi obtuse acuti, 0·3 cm. long. Corolla tota usque 1·2 cm. long.; tubus 0·1 cm. long.; lobi superiores alte retusi. Anthera 0·12 cm. long. Stylus sursum gradatim ampliatus, 0·5 cm. long. Indusium aliquanto bilabiatum.

This might be taken for a small form of *G. pinnatifida*, which, however, is larger in all its parts, and has a more tubular calyx. The upper lobes of its corolla are also more deeply divided, and the stamens are larger than is the case with the new plant. The style, too, of *G. mimuloides* is markedly different, as it has the rudiments of two divisions, and thus shows a slight approach to *Calogyne*. Camels are very fond of this plant.

APOCYNACEÆ.

48. *Alyxia buxifolia* R. Br. This, which is well known as the "Hop-bush," is an excellent food for camels, in spite of its belonging to a suspicious order. It is common in the Coolgardie district.

MYOPORINEÆ.

49. *Eremophila Oldfieldii* F. Muell. var. *angustifolia*. Between Doyle's Well and Mount George, June. Many species of this genus were secured, but the above is the only one seen to be touched by camels, and then not freely indulged in.

BORAGINEÆ.

50. *Echinospermum concavum* F. Muell. Common in Coolgardie district in springtime, growing there mixed with other lowly herbs.

PLANTAGINEÆ.

51. *Plantago varia* R. Br. Common round Coolgardie, Aug. A good fodder-plant, but, as it occurs only in the small forms, not of much account.

PHYTOLACCACEÆ.

52. *Codonocarpus cotinifolius* F. Muell. Mr. Ernest Giles, the well-known traveller, whose acquaintance I made at Coolgardie, assured me that this is a favourite food of camels. I did not come across the plant.

AMARANTHACEÆ.

53. *Trichinium Carlsoni* F. Muell. This charming little Amaranth is common in certain places round Coolgardie in springtime. The flowers are sometimes yellow, sometimes deep orange.

54. *T. exaltatum* Bth. Common in various places in the Coolgardie district. Camels are very fond of this when it is young, the rosetted leaves containing abundance of moisture. When the large fluffy flower-head springs up, they will not touch the plant; the inflorescence thus has the curious property of protecting the plant from injury.

CHENOPODIACEÆ.

55. *Rhagodia Billardieri* R. Br. var. *linearis*. Gnarlbine, Nov.

56. **R. coralliocarpa**, sp. nov. Frutex ramis albide furfuraceo-tomentosis demum glabris, foliis longipetiolatis hastatis raro hastato-oblongis subtus furfuraceo-tomentosis supra demum fere glabris, paniculis ramosis ramis folia excedentibus plurifloris furfuraceo-tomentosis, floribus polygamis ?, perianthii ultra medium fissi lobis oblongo-ovatis acutis furfuraceo-tomentosis, baccis globosis succa rubra indutis.

Hab. Crescit juxta puteum "Kilkenny soak" dictum, inter Mt. Margaret et Mt. George ubi mens. Jun. fructificat.

Rami subteretes in longitudinem eximie striati, nonnunquam sursum nudi et spinescentes. Folia alterna, plana, 0·6–1·2 cm. long., medio 0·5–0·7 cm. lat., supra virescentia, obtusa vel obtusissima, integra vel raro obscure denticulata; petioli foliis subæquilongi, furfuraceo-tomentosi. Paniculæ 2·0–4·0 cm. long., 1·5–2·0 cm. lat., ejus rami congesti, usque 1·0 cm. long., plerique vero breviores. Stamina non vidi. Calyx sub fructu usque 0·35 cm. ampliatus, ejus lobi 0·27 cm. long. Baccæ in sicco circa 2·0 cm. diam.

A very distinct-looking plant, intermediate, so far as regards its inflorescence, between the species with a much-branched and those with a not much branched or simple panicle. Among the former it may be compared with *R. parabolica* R. Br., which it somewhat resembles in leaf, though the markedly hastate form of the leaves of *R. coralliocarpa* affords a distinction, and the indumentum is not the same in the two cases. Moreover, the spiny character and the smaller fruits of *R. coralliocarpa* are other points of distinction. On the other hand, while presenting some points of resemblance to *R. spinescens* R. Br., its inflorescence and leaves are different, and the berries of *R. spinescens* are the larger.

57. *Atriplex nummularia* Ldl. This is *the* salt-bush *par excellence*, and yields abundance of nutriment to camels and stock of all kinds. It is common in various places throughout the districts visited by me.

58. *A. vesicaria?* Heward. Seen in various places, frequently growing with the last. The specimens are too incomplete to name definitely.

59. *Sclerolæna bicornis* Ldl. The so-called "cotton bush," very common in various districts. Yields very good food until the large woolly fruits make their appearance.

60. *Kochia villosa* Ldl. A common salt-bush round Coolgardie.

61. *K. villosa* Ldl., var. Another common salt-bush in the same district. *K. villosa* Ldl. is a very polymorphic species. Perhaps, however, the form here referred to a variety of it may be really distinct.

62. *K. sedifolia* F. Muell. Between Doyle's Well and Mount George, June. A most elegant little plant, its white densely tomentose stems and foliage contrasting prettily with the pink samaras.

63. *Salsola Kali* L. An excellent fodder-plant, yielding plenty of water as well as nutriment, so much so, that camels are said to be able to go longer without water than when feeding upon any other plant. It grows sparsely in various places in the goldfields.

64. *Salicornia arbuscula* R. Br. A common plant in the salt-pans. All these salt-bushes are greatly relished by camels.

POLYGONEÆ.

65. *Rumex crispus* L. In moist places close to the rocks at Bullabulling in Sept. Probably introduced by teamsters. Excellent fodder.

SANTALACEÆ.

66. *Exocarpus aphylla* R. Br. Common in various places in the goldfields. Camels will nibble at this when nothing better is at hand.

67. *Fusanus persicarius* F. Muell. The Quandong tree. Very common as a large bush in most places, except the salt-pans and near the granite. Next to the salt-bushes—perhaps indeed not even next to them—the most valuable food for camels, on account of its great abundance, and the large amount of nutriment and water contained in its leaves and young branches.

68. *F. spicatus* R. Br. This is the "sandal-wood" of prospectors, and is a common shrub from Pendinnie, near Mount Margaret, northwards. It is rarer in the south. A good fodder-plant.

LORANTHACEÆ.

69. *Loranthus pendulus* Sieb. var. *parviflorus*. Near Mount Malcolm, June. Grows on the Quandong, with which it is homoplastic. An excellent fodder.

70. *L. linearifolius* Hook. Found in places up-country growing on species of *Acacia*.

71. **L. miniatus**, sp. nov. Glaber, foliis parvis plerisque oppositis ramulos brevissimos per paria (raro unice) coronantibus anguste linearibus teretibus vel subteretibus, floribus parvis solitariis pedicellis brevibus brevissime alatis absque pedunculo communi suffultis, bractea conspicua late ovata acuta, calycis limbo prominulo obscurissime denticulato, alabastris linearibus parum clavatis, petalis 5 vel 6 lineari-lanceolatis paullo supra medium liberis, filamentis deorsum petalis adnatis, antheris adnatis parvis linearibus, stigmate capitato.

Hab. Viget super *Acaciæ* speciem (forsan *A. decoram* Ldl. vel affinem) prope puteos "Goose's soak" et "Kilkenny soak" dictas, ubi flores et fructus simul præbet mens. Jun.

Rami sat robusti, cinerei, rimosi et crebro lenticelliferi. Folia 2·0–3·0 cm. long., usque 0·1 cm. lat., pleraque vero tenuiora, sessilia, obtusa, ima basi dilatata; ramuli foliigeri nec ultra 0·1 cm. long. Pedicelli circa 1·0 cm. long., ascendentes, basi dilatati, sursum gradatim amplificati, ibique brevissime alati. Bracteæ vix 0·2 cm. long., carinatæ, obscure denticulatæ. Calyx 0·2 cm. long. Corolla 1·3–1·5 cm. long., pallide virens sursum lutescens vel aurantiaca; tubus superne parum ampliatus, facie superiore ultra medium fissus; limbi lobi circa 0·5 cm. long. Antheræ acutæ, 0·2 cm. long. Stylus robustus, corollæ subæquilongus. Bacca fusco-rubra, circa 0·5 cm. diam.

Undoubtedly near *L. linearifolius* Hook., of which I at first thought it might be a small-flowered variety. The reduced leaf-bearing-branches, small leaves, very small solitary flowers, and short anthers, are characteristic points. It is also very close to *L. Murrayi* Tate, a South Australian plant known to me by description only; but it differs from that in having opposite leaves crowning suppressed branches, entire and not two-lobed bracts, smaller flowers, narrow anthers, &c.

72. **L. Nestor**, sp. n. Ramis ramulisque arcte tomentosis demum fere glabris et cinereis, novellis rufo-tomentosis, foliis oppositis brevipetiolatis planis oblongo-ovatis obtusis vel obtusissimis arcte furfuraceo-tomentosis, ternationibus geminis pedicellatis, pedicellis pedunculis axillaribus compressis petiolos excedentibus suffultis, florum lateralium bractea late ovata fere omnino adnata, floris centralis oblonga vel lanceolata sursum libera lateralibus longiore, calyce dense lanato-tomentoso, petalis 5 modicis liberis dense lanato-villosis, filamentis ultra medium petalis adnatis, antheris adnatis oblongo-linearibus quam filamentis paullo latioribus bilocularibus.

Hab. Juxta puteum dictum "Bricke's soak" inter Goongarrie et Mt. Margaret repperi super *Acaciam* quandam vigentem et mens. Jun. florentem.

Ramuli subteretes, circa 0·3 cm. diam. Folia 3·0–5·0 cm. long., 1·5–2·0 cm. lat., basi rotundata vel acuta, crassiuscula, penninervia, nervis faciei superioris impressis, obscuris; petioli usque

1·0 cm. long., canaliculati. Pedunculi circa 1·5 cm. long., una cum pedicellis compressiusculi, 0·5–0·8 cm. long., dense ac minute furfuraceo-tomentosi. Bracteæ laterales 0·4–0·6 cm. long., obtusissimæ, earum pars libera 0·1–0·2 cm. long.; bractea lateralis 0·5–0·8 cm. long., pars libera 0·15–0·6 cm. long., bracteæ omnes furfuraceo-tomentosæ. Alabastra erecta, clavata, eorum tubus parum compressus, 0·3 cm. lat., apice fere usque 0·5 cm. lat. ibique subtetragona. Calycis limbus brevissimus, lobulatus; tubus vix 0·5 cm. long. et lat. Petala usque 2·7 cm. long., ultra staminum insertionem patentia, intus glabra et rubra. Filamenta tota 2·3 cm. long., eorum pars libera 0·5 cm. long. Antheræ 0·12 cm. lat., 0·4 cm. long. Stylus filiformis, petalis subæquilongus. Bacca ignota.

A remarkable species, quite distinct from any hitherto described from Australia. Its affinity appears to be with *L. Quandang* Ldl. and *L. grandibracteatus* F. Muell. The points by which the present plant can best be distinguished are the flat densely tomentose leaves, and the still denser and longer tomentum covering the broad flowers and their peduncles and pedicels. The petals also are connate below. *L. gibberulus* Tate, which I have not seen, has apparently the same tomentum, but its leaves are terete and narrow, and there are several other important differences. Perhaps this ought not to have been included as a camel-food, as some camels reject it; others, however, will eat it. The objection to it seems to be founded upon the presence of the tomentum.

CONIFERÆ.

73. *Frenela robusta* A. Cunn. Strange to say, camels will take a few mouthfuls from this tall shrub, though it contains much resin.

GRAMINEÆ.

74. *Eragrostis chætophylla* Steud. A little of this and other grasses is occasionally eaten by camels, especially when the haulms are in an early fresh state.

Before closing, I should like to say a few words about the poisoning of camels. That this has occurred upon the goldfields, the circumstantial narratives one has received leave no manner of doubt; where uncertainty lurks is in regard to the species of plants which have so injurious an effect. The Gastrolobiums and other of their allies of the tribe *Podalyriæ* would in all probability be fatal to camels, as they so often are in the western parts of the colony to sheep and cattle; and the same remark should apply to species of *Solanum*. However, though I made frequent enquiries about poison-plants, and though several prospectors averred their acquaintance with such, some even promising to produce them, yet I never came across a single authenticated poison. One description given to me led me to infer that at the Hospital Rocks, near Mount Ida, a species of *Solanum* deserves a sinister reputation; and in the Dundas Goldfield, south of Coolgardie, where there is undoubtedly much poison, the culprit was described as looking much like a gum-tree, but what this can be it is difficult to surmise. It is worthy of remark that

I never saw camels browsing on vegetation known or reasonably supposed to be harmful; my early fears in respect of some, such as the Loranthi and *Alyxia buxifolia*, having proved quite groundless. Is it not possible that this may have been because there was always some more or less wholesome food within their reach? The idea is that the camel, so long as it can find a sufficiency of wholesome forage, will not turn to poison, but, should poison-plant largely monopolize a district, the animal will browse upon it, and frequently with fatal results. This idea is backed by information given me showing that, where poison-plant exerts its baleful effects, it occurs in large quantities.

It should be added that type-specimens of the species described in this paper, as well as the other fodder-plants, are in the Botanical Department of the British Museum.

PS.—Since writing the above, I find a second Myoporinea noted as a camel fodder-plant. This is—

75. *Eremophila maculata* F. Muell. var. *brevifolia*. Between Coolgardie and Broad Arrow; also between the latter place and Uladdie soak, March.

WELWITSCH'S AFRICAN FRESHWATER ALGÆ.

By W. West, F.L.S., and G. S. West, A.R.C.S.

(Plates 365–369.)

(Continued from p. 122.)

50. **C. callistum**, sp. n. (tab. 367, fig. 13). C. submediocre, circiter 1⅓-plo longius quam latius, profunde constrictum, sinu sublineari paullo aperto; semicellulæ pyramido-trapeziformes, angulis inferioribus subrectangularibus, angulis superioribus paullo rotundatis, apicibus leviter convexis et glabris, lateribus leviter convexis cum granulis acutis circiter 8 utrobique, etiam seriebus irregularibus duabus granulorum acutorum intra latus unumquemque et serie singula infra apicem, in centro granulis majoribus circ. 15 quincuncialiter ordinatis, punctulis 6 circa granulum unumquemque; a vertice visæ ellipticæ, levissime inflatæ in medio utrobique; a latere visæ subglobosæ. Long. 47 μ; lat. 34 μ; lat. isthm. 16 μ; crass. 20 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

51. **C. colonophorum**, sp. n. (tab. 367, fig. 1). C. mediocre, paullo latius quam longius, profunde constrictum, sinu angustolineari extremo subampliato; semicellulæ semicirculares apicibus truncatis, verruca magna conica ad angulum inferiorem et superiorem unumquemque, verrucis brevioribus conicis 4 ad latus unumquemque, verrucis obtuse conicis 3 intra marginem utrobique et verrucis 4 intra apicem, verruca simili supra medium sinus utrobique, serie transversa verrucarum majorum 4 trans medium

semicellulæ et supra serie verrucarum minorum alternantum 3; a vertice visæ anguste ellipticæ, verruca magna emarginata ad polum unumquemque, verrucis 8 utrobique verrucis medianis 4 multe majoribus et rotundatis, seriebus subirregularibus duabus verrucarum minorum intra marginem unumquemque; membrana dense punctata, cum zona scrobiculorum in semicirculis irregularibus circa series transversas duas verrucarum ordinata. Long. 61 μ; lat. 63–64 μ; lat. isthm. 18·5 μ; crass. 33 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This is a noteworthy species, the large size of the warts and their arrangement easily distinguishing it from any other; the four median warts on each side of the vertical view being especially pronounced.

52. **C. bilunatum,** sp. n. (tab. 367, fig. 17). C. subparvum, paullo latius quam longius, profunde constrictum, sinu aperto; semicellulæ late lunatæ, angulis convergentibus et attenuatis ad extremitates submamillatas, dorso multe convexo subsemicirculari crenato (crenis circ. 12), ventre late inflato subundulato angulos versus, seriebus lunatis duabus verrucarum rotundarum de angulo ad angulum; a vertice visæ fusiformi-ellipticæ, polis submamillatis, marginibus lateralibus undulatis, seriebus rectis duabus verrucarum depressarum de polo ad polum, verrucis paucis intra marginem lateralem unumquemque. Long. 36 μ; lat. 40 μ; lat. isthm. 9·5 μ; crass. 19 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

This characteristic species is nearest in outline to *C. præcelsum* W. B. Turn. and *C. indicum* W. B. Turn.

53. **C. mucronatum,** sp. n. (tab. 367, fig. 16). C. parvum, 1⅓-plo latius quam longius, profundissime constrictum, sinu angusto-lineari; semicellulæ depresso-semicirculares (non angulares), angulis basalibus mucronatis; a vertice visæ anguste oblongæ, polis rotundatis et mucronatis; a latere visæ globosæ; membrana punctata. Long. 23–25 μ; lat. 27–30 μ; lat. isthm. 5 μ; crass. 10·5–11·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Inter *Utriculariam*, Morro de Lopollo; April, 1860. No. 179.

This species is distinguished from *C. pseudotaxichondrum* Nordst. by its rounded semicells, by the complete absence of granules, and by the oblong vertical view.

54. C. PSEUDOTAXICHONDRUM Nordst. in *Öfvers. K. Vet.-Akad. Förh.* no. 3, 20, t. ii. f. 5 (1877).

Var. AFRICANUM, var. n. (tab. 367, fig. 14). Var. cellulis minus angularibus et latioribus, serie granulorum 3 juxta et infra apicem semicellulæ uniuscujusque, annulo punctorum minutorum circa granulum unumquemque; a vertice visis granulis 3 in medio utrobique pyrenoidibus binis in semicellula unaquaque. Long. 27 μ; lat. 35 μ; lat. isthm. 9·5 μ; crass. 17 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

55. **C. huillense,** sp. n. (tab. 367, fig. 15). C. submediocre, circiter tam longum quam latum, profunde constrictum, sinu lineari; semicellulæ subsemicirculares, angulis basalibus submamillatis, apicibus 6-undulato-granulatis et intra apicem cum granulis tribus, in centro granulis circiter 22 subirregulariter dispositis, etiam scrobiculis minutis inter granula omnia; a vertice visæ ellipticæ, polis conicis et truncato-emarginatis, lateribus undulato granulatis polos versus planis; a latere visæ subglobosæ lateribus 4–5-undulato-granulatis et apicibus granulis circiter 3. Long. 54 μ; lat. 51 μ; lat. isthm. 23 μ; crass. 30 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This differs from *C. taxichondrum* Lund. in having three groups of granules on each semicell, one across the front of each side of the semicell and one at the apex, in the more numerous and smaller granules, and in the presence of minute scrobiculations round these granules.

56. **C. angolense,** sp. n. (tab. 367, fig. 7). C. parvum, paullo longius quam latius, modice constrictum, sinu lineari; semicellulæ semicirculares et depressæ, angulis inferioribus apiculatis, serie regulari spinarum parvarum circiter 13 in ambitu, serie regulari granulorum 6 intra apicem, granulo magno singulo intra marginem lateralem unumquemque et prope sed intra eo verruca depressa, serie transversa verrucarum depressarum 3 supra isthmum et granulo minuto supra extremitatem sinus uniuscujusque; a vertice visæ ellipticæ, polis submucronatis, serie verrucarum depressarum parvarum 7 ad marginem utrobique minoribus polos versus, granulis 6 intra marginem lateralem unumquemque, seriebus duabus spinarum inter seriem granulorum de polo ad polum; a latere visæ subglobosæ apicibus truncatis. Long. sine spin. 33 μ, cum spin. 38 μ; lat. sine spin. 29 μ, cum spin. 31 μ; lat. isthm. 18 μ; crass. 17·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

The two series of spines in vertical view are concave towards each other.

57. **C. tetrastichum,** sp. n. (tab. 367, fig. 9). C. parvum, paullo latius quam longius, profunde constrictum, sinu angusto-lineari extremo ampliato et extrorsum subaperto; semicellulæ subsemicirculares apicibus depressis, denticulo parvo ad angulum basalem unamquemque, marginibus lateralibus minute granulatis, seriebus parallelis duabus verrucarum quadrigranulatarum circiter 6 intra apicem, granulis paucis sparsis intra angulos basales; a vertice visæ ellipticæ et subcompressæ, polis acutis, serie verrucarum depressarum circiter 6 ad marginem utrobique et serie simili intra ea utrobique; a latere visæ subglobosæ. Long. 28 μ; lat. 31 μ; lat. isthm. 13 μ; crass. 15 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179. Lopollo; Febr. 1860. No. 192.

Var. DEPAUPERATUM (tab. 367, fig. 10). Var. semicellulis angulis basalibus sine dente parvo, verrucis non granulatis, in serie superiori 6 et in serie inferiori 5. Long. 29 μ; lat. 34 μ; lat. isthm. 13·5 μ; crass. 15 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

58. C. SUBSPECIOSUM Nordst. in *Öfv. af K. Vet.-Akad. Förh.* no. 6, 22, t. vi. f. 13 (1875). Long. 69 μ; lat. 51 μ; lat. isthm. 17 μ; a form which is most probably var. *validius* Nordst., but specimens not in a condition for the satisfactory determination of this point.

Pungo Andongo. In rivulis; March 1857. No. 105.

59. **C. Welwitschii,** sp. n. (tab. 367, fig. 2). C. magnum, circiter 1½-plo longius quam latius, profunde constrictum, sinu aperto extremo obtuso; semicellulæ subglobosæ latiores basin versus, apicibus leviter depressis, serie verrucarum emarginatarum circiter 19 in ambitu, etiam verrucis magnis conicis supra superficiem sparsis (interdum geminatis); a vertice visæ subglobosæ, seriebus approximatis duabus verrucarum emarginatarum de polo ad polum, verrucis conicis sparsis inter seriem unumquemque et marginem; membrana inter verrucas dense scrobiculata, Long. 98–100 μ; lat. 63–66 μ; lat. isthm. 22–24 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Etiam inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

This handsome species approaches *C. Lagerheimianum* [*Dysphinctium Lagerheimianum* W. B. Turn. in *K. Sv. Vet.-Akad. Handl.* Bd. 25, no. 5 (1893), 43, t. xxii. f. 6], but differs greatly in its much deeper constriction, in its flattened apices, in the double series of emarginate warts, in the shorter conical warts (not elongated papillæ), and in the very densely scrobiculate membrane. In the vertical view the double series of emarginate warts are concave towards each other in the centre, and subparallel towards the poles.

60. **C. æquinoctiale,** sp. n. (tab. 365, fig. 11). C. parvum, circiter 1⅔-plo longius quam latius, leviter constrictum, sinu late aperto et rotundato; semicellulæ suborbiculares base complanata, membrana granulata, granulis parvis seriebus verticalibus circiter 8 (ut visis) ordinatis (in serie unaquaque circiter 7); a vertice visæ subglobosæ granulis subradiatim ordinatis, in ambitu circiter 19. Long. 26 μ; lat. 15·5 μ; lat. isthm. 10 μ; crass. 14 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

This is distinguished from *C. orbiculatum* Ralfs in its less orbicular semicells, its much broader isthmus, and in its smaller granules with definite arrangement. Compare also with *C. qualum* [*Dysphinctium qualum* W. B. Turn.].

61. C. CONTRACTUM Kirchn. in Cohn, *Kryptogamen-flora von Schles.* Zweit. Bd. 147 (1878); Wolle, *Desm. U. S.* 63, t. 16, f. 1; t. 50, f. 24 (1884). Long. 35 μ; lat. 22 μ; lat. isthm. 10·5 μ; crass. 18 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

62. **C. Oocystidum,** sp. n. (tab. 366, fig. 21). C. subparvum, circiter 1⅓-plo longius quam latius, levissime constrictum, sinu minute excavato; semicellulæ late pyramidato-trapeziformes, angulis superioribus leviter rotundatis, apicibus latis et rectis, lateribus subrectis (leviter convexis); a vertice visæ ellipticæ, polis acutis et submamillatis; a latere visæ quadrato-ovatæ, apicibus truncatis;

membrana dense punctata. Long. 32·5–35 μ; lat. 26–27 μ; lat. apic. 12·5–13·5 μ; lat. isthm. 25 μ; crass. 17–18 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

63. C. CUCURBITA Bréb. in Desmaz. *Pl. Cryptog. Fr.* fasc. xxiii. 1103 (1841), in ed. i. ser. i. (1825–51); Ralfs, *Brit. Desm.* 108–9, t. xvii. f. 7 (1848). Long. 29–31 μ; lat. 15–19 μ; lat. isthm. 14–18 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179. Morro de Lopollo; Febr. 1860. No. 192.

All the African examples are more densely and minutely punctate than the typical plant.

Forma MINOR. Long. 21–24 μ; lat. 12·5 μ; lat. isthm. 11 μ.

Huilla. Cum forma typ. Nos. 176 and 179.

Var. MINIMUM, var. n. Long. 12·5 μ; lat. 7·5 μ; lat. isthm. 7 μ.

Huilla. Cum forma typ. No. 179.

64. C. PALANGULA Bréb. in Ralfs, *Brit. Desm.* 212 (1848). Forma semicellulis punctis insignis et densis, subirregulariter dispositis. Long. 36 μ; lat. 15 μ; lat. isthm. 13·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

13. STAURASTRUM Meyen (1829).

1. S. LEPTODERMUM Lund. in *Nova Acta R. Soc. Scient. Ups.* ser. 3, viii. no. ii. 58, t. iii. f. 26 (1871).

Forma MINOR. Forma subminor, angulis minus productis. Long. 46 μ; lat. cum spin. 42 μ; lat. isthm. 18 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

2. **S. tripodum**, sp. n. (tab. 369, fig. 11). S. parvum, 1¼-plo latius quam longius (sine spinis), profunde constrictum, sinu aperto; semicellulæ transverse subrectangulares, latere ventrali inflato, angulis basalibus dentato-mamillatis, marginibus lateralibus leviter convergentibus apices versus, apicibus pæne rectis (leviter convexis), spina longa valida suberecta (long. 13 μ) ad angulum superiorem unumquemque; a vertice visæ triangulares, lateribus leviter concavis, angulis acutis (submucronatis), prope et intra apicem anguste uniuscujusque spina valida multe abbreviata ut visa; membrana glabra. Long. sine spin. 21 μ, cum spin. 46 μ; lat. 26 μ; lat. isthm. 9 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This species and *S. xiphidiophorum* Wolle are respectively simple and complex species of a distinct section of this genus.

3. **S. crux-alternans**, sp. n. (tab. 369, fig. 14). S. minutum, tam longum quam latum (cum processibus), sinu semicirculari (cum latere inferiori processuum), parte mediana cellularum subcylindrica, partibus apicalibus cellularum transverse subellipticæ, polis in processus breves latos glabros truncato-emarginatos productis, apicibus leviter convexis granulo singulo utrobique prope sed supra basin processus uniuscujusque; a vertice visæ quadrangulares lateribus

concavis, angulis in processus breves (paullo longiores quam latiores) latos truncato-emarginatos productis, granulo intra basin processus uniuscujusque, processibus unius semicellulæ cum iis alterius alternantibus; membrana glabra. Long. 15 μ; lat. 15 μ; lat. isthm. 6 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

This at first sight reminds one of *S. inconspicuum* Nordst.; but it differs in its much more robust processes, which are directed horizontally, and have not the nodulose swelling on the under side.

4. **S. huillense,** sp. n. (tab. 368, fig. 17). S. minutum, $1\frac{1}{3}$-plo latius quam longius, profundissime constrictum, sinu lineari; semicellulæ late oblongo-rectangulares, angulo inferiori unoquoque cum spina brevi convergenti, verruca emarginata lateri uniquique, angulo superiori emarginato (subfurcato,—dente superiori longiori); a vertice visæ triangulares, lateribus leviter concavis, angulis subtruncatis, angulus unusquisque verrucam tridentam gerens. Long. sine spin. 15 μ; lat. 20 μ; lat. isthm. 6 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

5. **S. egregium,** sp. n. (tab. 369, fig. 12). S. parvum, circiter $1\frac{1}{3}$-plo longius quam latius, profunde constrictum, sinu aperto acutangulo; semicellulæ subrectangulares, marginibus lateralibus et apicibus rectis, angulis leviter rotundatis, angulis superioribus cum processu brevi lato bifurcato, angulis inferioribus verruca lata emarginata instructis; a vertice visæ triangulares, lateribus leviter concavis, spinis *tribus* ad angulos late truncatos (spina singula ad angulum unumquemque et spina mediana validiori); membrana glabra. Long. sine spin. 21–23 μ, cum spin. 26–27 μ; lat. sine spin. 15–17 μ, cum spin. 21–22 μ; lat. isthm. 7·5–9·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15. Etiam Morro de Lopollo; May 1860. No. 182.

This *Staurastrum* belongs to the same section as *S. quadricornutum* Roy & Biss. and *S. gemelliparum* Nordst., but is very distinct from either. Each of the three angles of the semicells is more or less quadrate with a short bifurcate process at the two upper corners, with an emarginate wart at each of the lower corners, and a short stout spine between the two emarginate warts.

6. **S. tridens-Neptuni,** sp. n. (tab. 369, fig. 7). S. mediocre, tam longum quam latum (sine spinis), profunde constrictum, sinu aperto acutangulo; semicellulæ late oblongæ, apicibus rectis, marginibus lateralibus leviter convexis, latere ventrali inflato (marginibus sinus rectis), spinis validis longis acutis tribus ad marginem lateralem unumquemque, spina centrali horizontali, spinis lateralibus divergentibus; a vertice visæ semper pentagonæ, lateribus levissime concavis, spinis validis tribus ad angulos acutos verticaliter dispositis. Long. sine spin. 34·5 μ; lat. sine spin. 34 μ, cum spin. 58 μ; lat. isthm. 15·5 μ.

Huilla. Freq. in paludibus exsiccandis; April 1860. No. 176. Etiam inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

The nearest species to this is *S. subtrifurcatum* West & G. S. West (in *Trans. Linn. Soc.* 2nd ser. v. 258–9, t. xvi. f. 24 (1896)), from which it is distinguished by the three diverging and somewhat shorter spines at each angle being situated in a vertical plane, and in the pentagonal vertical view with acute angles.

7. **S. pentateuchophorum**, sp. n. (tab. 369, fig. 6). S. mediocre, circiter 1¼-plo longius quam latius (sine spinis), profunde constrictum, sinu aperto et subrectangulari; semicellulæ elliptico-oblongæ, apicibus leviter convexis, lateribus sursum convergentibus, spina valida convergente ad angulum inferiorem unumquemque, spina valida suberecta incurvata ad angulum superiorem unumquemque instructa, etiam spinis 3–4 inter spinas majores irregulariter dispositis; a vertice visæ pentagonæ, lateribus profunde concavis, spinis 5–6 ad angulos late rotundatos. Long. sine spin. 36·5 μ, cum spin. 63 μ; lat. sine spin. 27–31 μ, cum spin. 46–49 μ; lat. isthm. 15 μ.

Huilla. Freq. in paludibus exsiccandis; April 1860. No. 176. Etiam freq. inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

This species is somewhat allied to *S. tridens-Neptuni*, but is very distinct from it.

8. **S. heteroplophorum**, sp. n. (tab. 369, fig. 8). S. mediocre, 1⅕-plo latius quam longius (sine spinis), profunde constrictum, sinu aperto acutangulo; semicellulæ transverse oblongæ, ventro inflato, apicibus pæne rectis (subconcavis), lateribus subrectis apicibus versus convergentibus, spina valida acuta convergente ad angulum inferiorem unumquemque, spina valida suberecta (subdivergenti) acuta ad angulum superiorem unumquemque, etiam cum spinis paucis multe minoribus circa spinas majores subirregulariter dispositis; a vertice visæ triangulares, lateribus concavis et angulis obtuse rotundatis, spinis majoribus duabus ad angulos verticaliter dispositis, spinis minoribus circa angulos; membrana glabra. Long. sine spin. 19 μ, cum spin. 36–37 μ; lat. sine spin. 23–25 μ, cum spin. 33–40 μ; lat. isthm. 10·5 μ.

Huilla. Freq. in paludibus exsiccandis; April 1860. No. 176. Etiam inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

The arrangement of the spines on the much narrower angles (as seen in vertical view) easily distinguishes this species from *S. Hystrix* Ralfs. At each angle there are two large spines in a vertical plane, and about six much smaller ones round them; the latter are sometimes regularly disposed in a circle round the two larger ones.

Var. LATUM (tab. 369, fig. 9). Var. cellulis latioribus, sinu minus aperto; semicellulis angulis leviter subcapitatis et apicibus convexis, spinis parvis 6 multe reductis et in annulo circa spinis majoribus duabus ordinatis. Long. sine spin. 17 μ, cum spin. 26 μ; lat. sine spin. 23 μ, cum spin. 28 μ; lat. isthm. 6 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

9. **S. Pseudohystrix**, sp. n. (tab. 369, fig. 10). S. parvum, tam longum quam latum (sine spinis), profunde constrictum, sinu aperto acutangulo; semicellulæ transverse rectangulari-oblongæ,

apicibus rectis et lateribus subrectis, spinis longis tenuibus acutis curvatis circ. 4 ad latus unumquodque; a vertice visæ triangulares, lateribus leviter concavis, angulis truncatis cum spinis longis curvatis leviter divergentibus 4–5 instructis; membrana glabra. Long. sine spin. 15–17 μ, cum spin. 21–27 μ; lat. sine spin. 16–17 μ, cum spin. 27–29 μ; lat. isthm. 6·5–7·5 μ; long. spin. 4–6·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Etiam inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

This species differs from *S. Hystrix* Ralfs in its smaller size, its more angular semicells, its fewer, longer, thinner, and curved spines which are confined to the face of the truncate angles.

10. **S. Welwitschii,** sp. n. (tab. 369, fig. 1). S. subparvum, paullo longius quam latius (sine spinis), modice constrictum, sinu aperto extremo obtuso; semicellulæ oblongo-rectangulares, angulis rotundatis, apicibus latis et subrectis, spina valida suberecta ad angulum inferiorem unumquemque, spinis subincurvatis apices versus, spinis brevibus acutis 5–6 ad marginem lateralem utrobique; spinis parvis 10–15 (circiter) ad angulum unumquemque irregulariter dispositis et spina valida erecta supra eas; a vertice visæ pentagonæ, angulis rotundatis et spinatis, lateribus concavis et glabris. Long. sine spin. 34–45 μ, cum spin. 45–51 μ; lat. sine spin. 29–31 μ, cum spin. 34–37 μ; lat. isthm. 16–18 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This is a very characteristic species.

11. **S. Corbula,** sp. n. (tab. 369, fig. 2). S. parvum, $1\frac{1}{6}$-plo longius quam latius (sine spinis), profunde constrictum, sinu aperto extremo rotundato; semicellulæ transverse oblongæ, marginibus lateralibus rotundatis, apicibus latis (subæqualibus in latitudine cellulis) et rectis, spinis gracilibus erectis et leviter curvatis 2 ad angulum superiorem unumquemque, spinis brevissimis conicis circiter 7 ad margines laterales, et seriebus duabus (circ.) intra marginem unumquemque; a vertice visæ triangulares angulis late rotundatis, spinis brevissimis 7–8 ad angulos in ambitu et spinis similibus 11–12 intra marginem angulorum, lateribus glabris, rectis vel subconcavis. Long. sine spin. 27 μ, cum spin. 36 μ; lat. sine spin. 23 μ, cum spin. 25 μ; lat. isthm. 9·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This species has about twenty-five very short spines on each of the three angles of a semicell, over which is placed a pair of slender, erect and longer spines. It most nearly approaches *S. Welwitschii* in form and arrangement of spines, but differs from it in being triangular in vertical view, and in having a pair of slender erect spines in place of the single stout spine of the latter species. The angles are also furnished with more numerous and shorter spines, and it is moreover a smaller, much more constricted species.

Var. PULCHRUM (tab. 369, fig. 3). Var. semicellulis lateribus retuso-emarginatis ad medium et apicibus concavis; a vertice visis lateribus concavis, angulis rotundo-truncatis et subproductis. Long. sine spin. 30 μ, cum spin. 42 μ; lat. (cum spin. brev.) 27 μ; lat. isthm. 9·5 μ.

Huilla. Lopollo; Febr. 1860. No. 192.

12. **S. actinotum,** sp. n. (tab. 369, fig. 4). S. subparvum, circiter 1½-plo latius quam longius (sine spinis), profunde constrictum, sinu acuto et aperto; semicellulæ transverse elliptico-fusiformes, apicibus subtruncatis, spina acutissima singula subcurvata ad angulum subacutum unumquemque horizontaliter disposita, seriebus transversis duabus granulorum minutorum trans angulum unumquemque, serie verrucarum emarginatarum circiter 6 in margine apicis; a vertice visæ rotatæ, sexangulares, lateribus profunde concavis et minute undulatis, spina gracili longa subcurvata acuta ad angulum subacutum unumquemque, seriebus duabus granulorum minutorum trans angulum unumquemque, cum annulo verrucarum emarginatarum 12 intra marginem, duabus earum sub base anguli uniuscujusque dispositis. Long. 23 μ; lat. sine spin. 36 μ, cum spin. 57 μ; lat. isthm. 9·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This peculiar *Staurastrum* does not appear to be closely related to any other.

Var. SIMPLEX (tab. 369, fig. 5). Var. semicellulis sine annulo apicali verrucarum emarginatarum; semicellulis late obtriangularibus, apicibus latis et subrectis; a vertice visis pentaradiatis; spinis validioribus longioribusque. Long. 30 μ; lat. sine spin. 35 μ, cum spin. 63 μ; lat. isthm. 15 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

13. **S. cassidum,** sp. n. (tab. 368, fig. 21). S. parvum, circiter duplo longius quam latius, profunde constrictum, sinu lineari; semicellulæ conico-pyramidatæ, apicibus et angulis basalibus rotundatis, lateribus rectis vel leviter retusis; a vertice visæ triangulares, angulis acute rotundatis et levissime productis, lateribus rectis, isthmo trigono, angulis unius semicellulæ cum iis alterius alternantibus; membrana punctata et leviter incrassata ad apices semicellularum. Long. 38·5–42 μ; lat. 20–22 μ; lat. isthm. 7·5–9·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

This species is distinguished from *S. trihedrale* Wolle (*Desm. U. S.* 123, pl. 40, f. 12–14; West & G. S. West in *Trans. Linn. Soc.* 2nd ser. v. 260–1, t. xvi. f. 29) by its smaller size, its more conical semicells with comparatively broader apices and almost straight sides, by the form of its vertical view, and by the much smaller and more numerous markings on the membrane. *S. trihedrale* var. *rhomboideum* West & G. S. West (*l. c.* f. 30) seems to be intermediate in form between this species and *S. trihedrale*, but it has the characteristic basal angles, the narrow apex, and the markings of *S. trihedrale*, whereas none of these characters are possessed by *S. cassidum*.

14. **S. areolatum,** sp. n. (tab. 367, fig. 17). S. magnum, duplo longius quam latius, profunde constrictum, sinu sublineari et aperto extremo rotundato; semicellulæ subquadratæ angulis rotundatis; a vertice visæ trigonæ lateribus rectis; membrana crassa, ad apicem crassissima, valde scrobiculata, scrobiculis majori-

bus ad angulos tres et apicem. Long. 133 μ; lat. 65 μ; lat. isthm. 27 μ; crass. membr. 3 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April, 1860. No. 179.

This is very distinct from *S. cosmarioides* Nordst. (in *Vidensk. Medd. f. d. naturh. Foren.* (1869), no. 14–15, 223, t. iv. f. 43 (1870)), and it is different in the form of its front view and in its membrane from any species of *Cosmarium*. Börgesen, in *Vidensk. Medd. f. d. naturh. Foren., Kjöben.* 1890, 50 (1891), figures (under a wrongly stated magnification!) under the name of *S. cosmarioides* forms which he suggests may be trigonal and tetragonal forms of several species of *Cosmarium*. His fig. 2 somewhat approaches this species in form, but it has different basal angles, and a very different sinus.

15. **S. scrobiculatum**, sp. n. (tab. 368, fig. 18). S. minutum, pæne 1⅓-plo longius quam latius, modice constrictum, sinu aperto subrectangulo; semicellulæ subellipticæ, marginibus inferioribus subrectis; a vertice visæ trigonæ, lateribus subrectis, angulis late rotundatis; membrana subsparsim scrobiculata. Long. 23 μ; lat. 15·5–18 μ; lat. isthm. 10 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

16. S. PUNCTULATUM Bréb. in Ralfs, *Brit. Desm.* 133, t. xxii. f. 1 (1848).

Forma 3-gona. Long. 26 μ; lat. 23 μ; lat. isthm. 8 μ.

Pungo Andongo. In rivulis (Casalalé); March 1857. No. 105.

Forma 4-gona. Long. 34 μ; lat. 31 μ; lat. isthm. 14·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

17. S. DILATATUM Ehrenb. *Infus.* 143, t. x. f. 13 (1838); Ralfs, *Brit. Desm.* 133, t. xxi. f. 8 (1848). Long. 21 μ; lat. 25 μ; lat. isthm. 7·5 μ.

Pungo Andongo. In rivulis (Casalalé); March 1857. No. 105.

Var. INSIGNIS Racib. in *Rosprawy Akad. Umiej. Krakow, Wydzial. mat.-przyr.* ser. 2, t. ii. (vol. xxii.) 388, t. vii. f. 13 (1892). Long. 20–25 μ; lat. 17–22 μ; lat. isthm. 8·5–9·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

18. S. HEXACERUM (Ehrenb.) Wittr. in *Bih. t. K. Vet.-Akad. Handl.* Bd. 1, no. 1, 51 (1872). *Desmidium? hexaceros* Ehrenb. *Abhandl. Akad. Wissenschaft., Berlin*, 1833, 293 (1835); *Infus.* 141, t. x. f. 10 (1838). Long. 15 μ; lat. 21 μ; lat. isthm. 5·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

19. S. MICRON West & G. S. West in *Journ. R. M. S.* 159, t. iv. f. 50–51 (1896).

Var. ANGOLENSE, var. n. (tab. 368, fig. 19). Var. semicellulis subdepressis, lateribus subrectis, angulis minus productis, spinis distincte longioribus. Long. 14 μ; lat. 17 μ; lat. isthm. 4 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

20. S. GURGELIENSE Schmidle in *Oesterreich. Botan. Zeitschr.* 64, t. xvi. f. 23, 24 (1896).

Var. TROPICUM, var. n. (tab. 368, fig. 20). Var. semicellulis plus ventricosis, spinis minoribus et numerosioribus, in seriebus transversis trans angulos, apicibus processuum brevium tridenticulatis. Long. 20 μ; lat. 27 μ; lat. isthm. 8 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

This may be a proper species, but only one example was met with, and, until further examples are obtained, it had better be regarded as a variety of Schmidle's alpine species.

21. S. ELEGANTISSIMUM Johnson in *Bull. Torr. Bot. Club*, xxi. 290, t. 211, f. 16 (1894).

Var. REDUCTUM, var. n. Var. paullo minor, processibus brevioribus, spinis minoribus, dentibus ad apices processuum multe minoribus, sine annulo spinarum brevium ad basin semicellularum. Long. 30 μ; lat. cum proc. 37 μ; lat. isthm. 8 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

22. **S. cerastoides,** sp. n. (tab. 369, fig. 13). S. subparvum, circiter $1\frac{1}{3}$-plo latius quam longius (cum processibus), leviter constrictum ad medium; semicellulæ introrsum lunatæ lateribus ventralibus late tumidis, extremitatibus in processus breves attenuatos inflexos productis, per marginem dorsalem totum aculeis brevibus 14 (circ.) supra verrucas parvas (verrucis infra marginem) regulariter dispositis, apicibus processuum leviter recurvatis et tridenticulatis, marginibus inferioribus processuum et semicellularum glabris, serie transversa verrucarum denticulatarum trans semicellulas et secundum processus, seriebus annularibus duabus granulorum minutorum ad basin semicellularum; a vertice visæ late fusiformes, verrucis emarginatis utrobique sensim et sensim diminutis polos denticulatos versus, etiam serie aculeorum minutorum intra marginem unumquemque de polo ad polum. Long. sine spin. 34·5–36·5 μ, cum spin. 38–39 μ; lat. (cum proc.) 48–50 μ; lat. isthm. 13–15 μ; crass. 18 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15. Etiam in paludibus exsiccandis; April 1860. No. 176.

This species possesses in common with its nearest ally *S. Cerastes* Lund. a smooth under surface to the processes which have a faintly recurved apex, as well as a double series of warts along each side. The character and arrangement of these warts, however, its less incurved processes, the different form of its semicells, together with the constantly fusiform vertical view, readily distinguish it.

23. S. GRACILE Ralfs in *Ann. Nat. Hist.* xv. 155–6, t. xi. f. 3 (1845); *Brit. Desm.* 136, t. xxii. f. 12 (1848).

Var. CYATHIFORME West & G. S. West in *Trans. Linn. Soc.* ser. 2, v. 77, t. ix. f. 2 (1895). Long. 52 μ; lat. (c. proc.) 82 μ; lat. isthm. 15 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

Var. PUSILLUM West & G. S. West, *l. c.* f. 4. Long. 25 μ; lat. (c. proc.) 34 μ; lat. isthm. 7·5 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

24. **S. angolense**, sp. n. (tab. 368, fig. 22). S. submediocre, circiter 1¾-plo longius quam latius (sine processibus), submodice constrictum; semicellulæ late cuneatæ, apicibus subrectis et levissime granulatis, angulis superioribus in processus divergentes longos denticulatos productis, apicibus processuum tridenticulatis, paullo supra medium cum seriebus transversis duabus granulorum (in serie unaquaque 3), serie superiori majori; a vertice visæ anguste ellipticæ, polis in processus longos denticulatos productis, cum granulis 3 ad marginem unumquemque. Long. sine proc. 27 μ, cum proc. 35 μ; lat. cum proc. 52 μ; lat. isthm. 11·5 μ; crass. 11·5 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

The nearest species to this is *S. brachioprominens* Börg. in *Vidensk. Medd. f. d. Naturh. Foren., Kjöben.* (1890), 47, t. v. f. 52 (1891); West & G. S. West in *Trans. Linn. Soc.* ser. 2, v. 265, t. xvii. f. 12 (1896), from which it differs in the absence of the denticulate apical verrucæ and the basal rings of granules, in the presence of the two transverse rows of granules at each side, and in the somewhat shorter and thicker processes.

25. **S. quadridentatum**, sp. n. (tab. 369, figs. 15, 16). S. submagnum, duplo latius quam longius (cum processibus), modice constrictum; semicellulæ subcyathiformes, ad basin bulbosis et irregulariter granulatis, angulis superioribus in processus longos subhorizontales rectos (vel leviter sigmoideos) cum marginibus denticulatis productis, apicibus processuum tridentatis, serie verrucarum emarginatarum 7–8 (majoribus earum in medio) juxta et infra apicem semicellulæ uniuscujusque, etiam verruca dentata intra basin processus uniuscujusque (circiter 10 μ seorsum); a vertice visæ elliptico-fusiformes, polis in processus longos denticulatos productis, serie verrucarum emarginatarum intra marginem lateralem unumquemque, etiam verrucis dentatis duabus prope medium utrobique, cum annulo dentium minorum circa dentem centralem supra verrucam unamquamque, base semicellularum oblonga polis rotundatis granulatis.

Zygosporæ globosæ et mamillatæ, processu delicato et leviter curvato supra mamillam unamquamque, apicibus processuum profunde bifidis, divisionibus patentibus et leviter recurvatis. Long. 37–42 μ; lat. cum proc. 73–84 μ; lat. isthm. 11·5–12·5 μ; diam. zygosp. sine proc. 40 μ, cum proc. 54 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Etiam inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

(To be continued.)

FERTILIZATION OF SPRING FLOWERS ON THE YORKSHIRE COAST.

By I. H. Burkill, M.A., F.L.S.

(Concluded from p. 145.)

Chrysosplenium oppositifolium.—This species is gynodiœcious at Scarborough. The ♀ plant is abundant throughout the district, and is easily noticed by reason of its greener hue—the golden yellow of the ☿ flowers being nearly absent. These ♀ flowers are smaller than the ☿ flowers, and the plant bearing them generally slighter—the leaves especially being smaller. There is no trace of stamens, and an almost complete absence of any transitional stage which might show the anthers of the ☿ flowers, becoming functionless and yielding a unisexual flower. Gynodiœcism has not previously been observed in this species, but, on the other hand, androdiœcism has.*

Bellis perennis. — We may contrast the insect-visitors observed in the small portion of the plant's flowering period with those seen elsewhere, remembering that these observations extend over the whole season.

	Hl.	Hm.	Hs.	L.	Dm.	Ds.	C.	Etc.	Total.
Yorkshire	1	2	1	2	3	8	2	1	20
Belgium	1	19	1	5	5	10	3	—	44
Germany	1	9	1	3	10	5	4	—	33

Thus contrasting these three, we notice that the mid-tongued bees are relatively numerous abroad, and that in neither Müller's nor MacLeod's observations do the flies reach so high a proportion as in these upon the spring fertilization on the Yorkshire coast.

We may compare also the visitors for the two years '95 and '96 (*see* Table VI.). In '96 the abundance of Scatophaga has a very marked effect. This fly is not purely anthophilous, but, like the spiders mentioned before, seizes other visitors to the flowers and kills them. This, perhaps, together with the less abundance of small flies in the second year, caused the tremendous falling-off in the numbers of the small dipterous visitors to *Bellis perennis.*

Petasites vulgaris.—I can only recall seeing the male inflorescence within the district.†

Tussilago Farfara.—This is probably the most successful plant of the early spring flora, being well suited to the prevalent insects. Indeed, we might almost expect such to be the case, for the *Compositæ* are one of the most, if not the most, successful race on the earth; and among them a plant producing its flowers before its leaves should be—to justify this departure from the usual state of things—a successful organism. Besides, the flowering of the simpler plants often is spread over a very considerable time, but in the coltsfoot the flowering season is for the most part compressed into one month.

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* Kobus, "Ueber *Chrysosplenium*," *Deutsche Bot. Monatsschr.* i. p. 74 (1883).

† Cf. Nicholson, "*Petasites officinalis* Moench," *Journ. Bot.* xxii. (n.s. xiii.), p. 251 (1884).

On the cliffs over the sea, where this plant abounds, the capitula contain about 200–300 ♀ florets, and about 40 ♂. On the slopes of the moors, at heights of 400–500 ft. above the sea, the capitula are usually smaller, sometimes as little as 15 mm. in diameter, those on the cliffs being 20–36 mm. With the less size of capitulum the number of disc florets is much reduced, and at the same time the tube of the flowers is shorter (3 mm. and upwards, those from the cliffs being 5–6 mm.), so that the less conspicuous the inflorescence is, the more accessible is the honey.

During flowering the tube of each disc-flower grows upwards of 1 mm.; at the same time the ligulate florets are growing, and also the receptacle is broadening. Thus the whole capitulum becomes somewhat more conspicuous as it passes over from the early stage, where none but ♀ florets are mature, to the late ♂ stage. As the capitulum becomes old and the growth of the corollas ceases, the power of closing at night, which, as is well known, depends on the unequal growth in the ligules of the ligulate florets, is gradually lost. In consequence, the ♀ flowers are better protected than the ♂ from the inclemencies of the weather. The bracts of the involucre in no way help in the expanding of the capitulum, but by maintaining a constant steady pressure tend rather to retard it.

The relation of ♀ to ♂ flowers is interesting, and bears out the well-marked specialization of the order. In most plants the fertilization of the ovules is the signal for the withering of the corolla of that flower: it is not so here, for the ♀ flowers may all be fertilized before any ♂ floret is open and yet maintain their freshness, upon which the conspicuousness of the capitulum depends, until the last ♂ flower has shed its pollen. Neutral florets with contabescent anthers may occasionally be found among the disc-florets.

The flower-season of the plant was almost completely observed; and we may compare the species of insect-visitors observed with those given by other observers, without the suspicion that perhaps the differences are due to want of observation of the whole of the plant's period of bloom.

	Hl.	Hm.	Hs.	L.	Dm.	Ds.	C.	Etc.	TOTAL.
Yorkshire	3	2	3	1	6	19	3	2	39
Germany	1	4	—	—	2	—	1	—	8
Alps*	—	3	1	2	11	10	—	—	27

Again, one remarks the greater proportions of the lower insects in Britain than in Germany. Müller observed Apis visiting "in hundreds." It is well to remember that the flies are easily scared away, and the bee that goes about its business without caring for anybody drives somewhat in this way the lower insects from its collecting grounds. To this extent the classes of insects are mutually exclusive.

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* H. Müller, *Alpenblumen*, p. 455; Leipzig, 1881.

Primula vulgaris.—The fertilization of this plant is yet unexplained. None of the insects seen on it through many hours of watching are sufficient for its fertilization. Gibson[*] has hazarded that in St. Kilda flies fertilize it, but such is far from proved. Archer Briggs[†] observed the visitors to it in S. Devon, and records that it is never visited by the larger humble-bees, and only rarely by the smaller kinds. Anthophora acervorum (Hl.) and Andrena gwynana (Hm.) are recorded as visiting, and also Gonepteryx rhamni (L.) and Bombylius medius (Dm.). Darwin observed Thrips in the flowers abounding, and while remarking the self-fertilization which these insects may bring about, suggests that the flower is cross-fertilized by nocturnal Lepidoptera,[‡] as is its congener *P. villosa*[§] by diurnal. Diametrically opposed to the above is Scott Elliot's observation that Bombus hortorum fertilized the flowers.[||]

The doubt does not end with our own shores. Knuth[¶] at Kiel has failed to observe insect visitors, and Cobelli[**] in the Tyrol can, besides four beetles and Thrips, only name one butterfly, Gonepteryx rhamni, as a visitor capable of cross-fertilizing the plant. He specially notes the fact that bees avoid it.

My night observations have been few and not conducted under the best of conditions, and though without results, I incline to Darwin's solution as the right one. Gonepteryx rhamni, recorded by two observers in widely-separated localities, doubtless assists, but its tongue-length (18 mm.) is insufficient to drain the honey of the larger flowers, reaching, according to Knuth, in N. Germany 25 mm. in depth. About Scarborough the average depth of the tube varies from 15 to 20 mm., and therefore the honey is beyond the reach of all bees which are on the wing at its flowering season, except Bombus hortorum.

Nepeta Glechoma may be found gynodiœcious—a condition well known[††]—from the earliest days of its flowering.

Salix spp.—All the species observed may be considered together, for insects are less likely to discriminate between the species than between their sexes. MacLeod has divided the willows into early- and late-flowering species. *S. alba* and *fragilis*, types of those flowering after the bursting of the leaf-buds, were not observed at Scarborough. Using MacLeod's convenient separation, we get the following table:—

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[*] "The Phanerogamic Flora of St. Kilda," *Trans. Bot. Soc. Edinburgh*, xix. p. 155 (1893).

[†] "On the Fertilization of the Primrose," *Journ. Bot.* viii. 1870, p. 190; and "On the Insects which Fertilize the Primrose," *Trans. Plymouth Institution*, iv. p. 188, 1871–2.

[‡] *Forms of Flowers*, pp. 36–37; London, 1884.

[§] H. Müller, "Fertilization of Flowers by Insects," *Nature*, xi. (1874), p. 110.

[||] *Flora of Dumfriesshire*, p. 114, Dumfries, 1896.

[¶] "Die Blüteneinrichtung von *Primula acaulis*," *Bot. Centralblatt*, 55, p. 225 (1893).

[**] "Osservazioni sulla fioritura e fecondazione della *Primula acaulis*," *Verhandl. d. Zool.-bot. Gesell. in Wien*, 42, p. 73 (1892).

[††] Cf. Willis, *loc. cit.*

	Hl.	Hm.	Hs.	L.	Dm.	Ds.	C.	Etc.	TOTAL
Yorkshire	4	2	1	1	5	21	1	2	37
Belgium	4	15	5	1	11	15	2	—	53
Germany	8	56	9+	4	22	11	3	1	114+

The want of small bees in Britain is very markedly shown.

Comparing the individuals visiting, we notice that in the milder season the long-tongued bees visited in greater numbers. Table V., column E, shows this again. The bees only appeared at the very end of the observations. Owing to them we get in this table (V.) two maxima in the case of *Salices*, one due to the species obtaining a large share of the short-tongued flies, the second due to the appearance of these bees. The same double curve is found also in *Tussilago*, where it was due to the Muscidæ and Scatophagidæ relatively. It is unsafe to lay any stress on the facts of these incomplete investigations, but such cases—well established—would help to demonstrate the origin of new species through seasonal dimorphism.*

Narcissus Pseudo-narcissus.—The diameter of the cream-coloured perianth is 40–50 mm., the depth of the funnel-shaped space within the corona and tube of the flower about 45 mm., the breadth of the mouth being 15 mm. The stigma and the stamens, which it overtops by 4–5 mm., are well protected by the corona. The anthers, which burst immediately after the opening of the flower, shed their pollen introrsely, in part on to the style. Large insects entering the flower will touch with their backs first the stigma, later the pollen-covered anthers and style, and as both ♂ and ♀ organs are mature at the same time, one visit is all that is required. The passages to the three nectaries at the base of the flower lie between the filaments, and are 1–1·5 mm. in breadth and 6 mm. remote from the honey. Thus long-tongued insects alone can obtain the honey. In fact, the flower is a most marked bee-flower, and probably the scarceness of blossoms (they are very much picked for the market) alone prevented me from observing the right insect visiting the flower.

SUMMARY AND CONCLUSION.

It has been shown how the short-tongued flies predominate in early spring to a very marked extent, and that they visit freely flowers of classes A, AB, B, and B′, also that the early spring flora of the Yorkshire coast is much more dependent on them for cross-fertilization than the same species in Belgium and Germany. To be dependent on less-specialized insects is in itself a disadvantage, and added to this must be the risk of inclement weather. If it be true, and there are as yet no facts to disprove it, that *Capsella* has its stamens aborted by reason of the cold, then we ask what gain comes to it by flowering early. *Ranunculus Ficaria* is so generally infertile, *Petasites vulgaris* so uniformly male, and *Ulex* and *Primula* set so little fruit—the former none from its early flowers—that they too do not seem to profit by their early flowering. If we ask how the species of the spring flora are propagated, we find that very few are annuals and must set seed at frequent periods or perish, and that others have a very considerable amount of vegetative reproduction, or are shrubs and trees which by their longevity can afford only to fruit at intervals of some years. This, however, does not explain what advantages they gain by flowering early.

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* Cf. Wettstein, "Der Saison-Dimorphismus als Ausgangspunkt für die Bildung neuer Arten im Pflanzenreich," *Ber. d. Deutschen Bot. Gesellsch.* xiii. p. 303 (1896).

We should note here the length of the flowering period of the plants. In some cases it is of short duration—e. g. *Tussilago*, *Salix*, *Anemone*, *Primula*, *Ranunculus Ficaria*, *Prunus*, &c., in others much protracted, so that, if the spring flowers go unfertilized, the summer ones yet afford the species another chance of setting seed; such are *Bellis*, *Capsella*, and some others, which for this reason are not exclusively spring plants. Of the exclusively spring flora we note that many are trees or shrubs—i. e. *Salix* spp., *Ulex europæus*, *Prunus communis*, *Corylus*, *Alnus*, *Ulmus*, and *Populus*; and many are plants which frequent shady places—i. e. *Anemone nemorosa*, *Chrysosplenium oppositifolium*, *C. alternifolium*, *Adoxa*, *Potentilla Fragariastrum*, *Viola odorata*, *V. canina*, *Lathræa Squamaria*, *Nepeta Glechoma*, *Primula vulgaris*, and *Narcissus Pseudo-narcissus*, besides the wind-fertilized *Mercurialis perennis*; several others are found, sometimes among bushes, sometimes in the open; while but a small minority —*Alchemilla arvensis*, *Empetrum nigrum*, *Cochlearia officinalis*, *Veronica arvensis*, and *Tussilago*—grow almost always where they get the full sun. On this we may found a fair hypothesis by which we can understand in part the early flowering of species. The key to the situation lies in the early flowering of the anemophilous trees. These can suffer from no competition for insect-visitors, and if it is advantageous to them to flower early, it must be for some other reason. Many certainly do flower early, and no better explanation could be desired than that given by Clarke* and Robertson†, namely, that the leaves would hinder the passage of the pollen from anther to stigma, not only by barring the way, but by preventing the wind from reaching the flowers. In the case of shade-loving entomophilous flowers the cause is the same—the insects would be prevented from seeing the bright colours by the mask of green leaves. There is little doubt possible that this is a reason for the early flowering of many plants; in the case of *Tussilago* and some others it is probably otherwise, and competition with other similar blossoms is avoided by their early flowering.

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* "The Philosophy of Flower Seasons," *Am. Naturalist*, xxvii. p. 769 (1893).

† "The Philosophy of Flower Seasons, and the Phænological Relations of the Entomophilous Flora and the Anthophilous Insect-Fauna," *Am. Naturalist*, xxix. p. 97 (1895).

The uncertainty of spring weather must affect the plants through the insects visiting them. The severe winter of 1894–95, by killing great numbers of small mammals—field-mice, &c.—probably had something to do with the abundance of the Muscidæ in the end of the following March, and perhaps the Scatophagidæ may have been more abundant in 1896 because the mild winter permitted their dung-feeding larvæ to continue growth through the greater part of it. Readers will remember Darwin's[*] classical instance of the effect of cats on the abundance of clover; just such a case of the complicated inworking of things is the apparent effect of a severe winter on the fertilization and consequent fruit-setting of plants flowering later. Writing of the island of St. Kilda, in the Outer Hebrides, Gibson[†] says, "some species, at least in certain years, are not fertilized at all, e. g. *Vicia sepium*, *Trifolium pratense*, and *Lonicera*." How seasons affect the seed-setting of different species is a question for the future. Dureau de la Malle[‡] says that in thirty years, on one undisturbed moor, he observed five or six successive changes by which *Leguminosæ* dominated over the grasses, and in turn grasses over the *Leguminosæ*. Were such changes in any degree the effect of want of fertilization?

Hermann Müller has written, "the uniform perfection which Axell supposes to exist in Nature has no real existence."[§] Some observers among us have dazzled their eyes by the mechanisms of the most nearly perfect of flowers—*e. g.* orchids—and have failed to see the imperfect around them; others have blindfolded themselves to the advantages of cross-fertilization. To neither should we trust too much. I am convinced that the truth lies in the mean, and if this paper has suggested much that is imperfect, it has fulfilled its purpose.

Lastly, I must express my thanks to those who have helped me in the field—my father, my brother, and Mr. J. C. Willis; and, for whatever is of entomological worth, to my kind entomological friends Dr. D. Sharp, Messrs. G. H. Verrall, E. Saunders, and C. Warburton.

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[*] *Origin of Species*, chap. iii. 6th ed. i. p. 90; London, 1872.

[†] *Loc. cit.* p. 155.

[‡] "Mémoire sur l'Alternance," *Annales des Sciences Nat.* Ser. i. vol. v. p. 353 (1825).

[§] *Fertilization of Flowers*, p. 589.

NOTES ON MYRMECODIA.

By James Britten, F.L.S.

I have lately been engaged in naming the drawings made by Sydney Parkinson of the plants collected during Cook's first voyage (1768–1771); and in the course of so doing have noted several points of interest which I hope later to publish in this Journal. Among the drawings is one of a *Myrmecodia*, which seems worthy of special attention.

Unfortunately, while I was collecting material on the subject, Mr. Hemsley, to whom I am indebted for some help, by what I must regard as a curious coincidence published in the *Kew Bulletin* a note upon *Myrmecodia*, in which he anticipates some of the information I had brought together.* As, however, this paper is mainly concerned with Banks's plant, I do not propose to omit the history of our knowledge of *Myrmecodia* as an Australian genus, which I had drawn up before Mr. Hemsley's printed note made me aware that he was working at the subject with a view to publication.

The first recorded occurrence of any *Myrmecodia* in Australia seems to be that by Dr. George Bennett in this Journal for 1868, pp. 50–52. This, with a *Hydnophytum*, was brought from Cape York by Captain Nares in September, 1866, and was presented by him to the Botanic Gardens at Sydney. In December of the same year, Mr. C. Moore of the Sydney Gardens sent specimens to Kew, and a second consignment in May, 1867. Dr. (now Sir Joseph) Hooker, in acknowledging these, wrote to Dr. Bennett—"Their discovery in Australia is most remarkable": he speaks of the *Myrmecodia* as *M. armata*, and says that it arrived at Kew alive. Mr. Hemsley, however, tells me that the entry in the Gardens record states that the plants were dead on arrival.

The next record of an Australian *Myrmecodia*—if we except a passing reference to Dr. Bennett's paper in Mueller's *Fragmenta*, vii. 45—is in the *Systematic Census of Australian Plants* (1882), p. 75, where Mueller mentions *M. echinata* Gaud. as found in Queensland and North Australia. Prof. Beccari, in the chronological arrangement of records prefixed to his admirable monograph in *Malesia* (ii. 7–340 (1884)), thinks that in all probability this plant, as well as *M. armata* of the earlier record, should be referred to *M. Antoinii* (misspelt *Antonii* in Jackson's *Index*)—a species from Thursday Island, Torres Straits, figured and described by F. Antoine in *Oesterr. Bot. Zeitschrift*, xxxii. 347–353 (1882), as *M. echinata*, but subsequently distinguished by Beccari (*l. c.* 116).†

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* I am glad to note that the difficulties which rendered it "impossible to assign the papers in the *Bulletin* to single individuals" have apparently been overcome, as Mr. Hemsley's initials are appended to this article. In the interests of convenience it is to be hoped that this practice may be continued (see *Journ. Bot.* 1893, 382).

† Since this note was written, *M. Antoinii* has been figured in *Bot. Mag.* t. 7517 from a specimen presented to Kew Gardens by Prof. Stewart in 1893, which flowered and ripened seeds in 1896.

Although in the second edition of his *Census* (1886) Mueller adopts this opinion so far as the Queensland plant is concerned—the locality of North Australia is omitted from this edition—it seems to me more probable that the Australian plants are to be referred to *M. Beccarii*, under which species I place the plant collected by Banks. This plant, described by Sir Joseph Hooker in *Bot. Mag.* t. 6883 (1886), was imported by Messrs. Veitch from Brisbane in 1884, "with the information that it was found in the Gulf of Carpentaria, and is extremely rare there."

It is strange that a genus so remarkable should have been discovered in Australia nearly a century before any record of its occurrence in that continent should have been published in any scientific work; and it may be wondered that the passage in Hawkesworth's *Voyages*—derived, like so much that is of interest in the collection, from Banks's Journal—should not have attracted the attention of botanists. The passage in the *Journal*, as published last year under the editorship of Sir Joseph Hooker, is as follows:—

"A third sort [of ant] nested inside the root of a plant which grew upon the bark of trees in the same manner as mistletoe. The root was the size of a large turnip, and often much larger; when cut, the inside showed innumerable winding passages in which these animals lived. The plant itself throve to all appearance not a bit the worse for its numerous inhabitants. Several hundreds have I seen, and never one but what was inhabited; though some were so young as not to be much larger than a hazel nut. The ants themselves were very small, not above half as large as our red ants in England; they sting indeed, but so little that it was scarcely felt. The chief inconvenience in handling the roots came from the infinite number; myriads would come in an instant out of many holes, and running over the hand tickle so as to be scarcely endurable. Rumphius has an account of this very bulb and its ants in vol. vi. p. 120, where he describes also another sort, the ants of which are black" (p. 304: August, 1770).

At the time this note was written, and indeed for long afterwards, Rumphius's was the only description of these remarkable plants; and Banks's observations are the only ones I know between the dates of Rumphius's *Hortus Amboinensis* (1750) and Jack's establishment of the genus *Myrmecodia* in 1825 (*Trans. Linn. Soc.* xiv. 122). It is thus the more to be regretted that Solander's carefully drawn-up description should never have been published, especially as the nature of this "nidus germinans" had long puzzled botanists. "Tali piante rimasero per i Botanici un enigma per molti anni, e Linneo non seppe a qual classe riportarle, nè dette loro nome di sorta. Stickman che scrisse una dissertazione sull' *Herbarium Amboinense* (*Amoen. Acad.* iv. 136) citando la tav. LV del vol. VI del Rumphius, dice di essa semplicemente 'Nidus germinans ex formicis monstruosus bulbus'" (Beccari, *l. c.* 81).

It may be of interest to print Solander's description as it appears in his MS. *Plantæ Novæ Hollandiæ*—a careful transcript by himself of his rough notes, which we also have in the Department of Botany.

Although I think it undesirable to print MS. names which can only be regarded as synonyms, it seems well to do so in this instance, as a means of tracing the description and of correlating it with the drawing, which bears the same name. Solander's description runs:—

EPIDENDROIDES TETRANDRA.

Calyx tubulosus, margine integer, basin tubi arcte cingens, 1-linearis, albus, tenuis, glaber, sæpe obsoletus.

Corolla monopetala, nivea, subcarnosa, subpellucida. *Tubus* cylindraceus, e bulbo seu tubere sæpe a formicis magna facto, egrediens; 4-linearis. *Limbus* quadripartitus, parum patulus. *Laciniæ* oblongæ acutæ, subæquales, tubo duplo breviores.

Filamenta quatuor, fauci ad sinus limbi inserta, alba, erecta, laciniis corollæ duplo breviora, æqualia.

Antheræ oblongæ, erectæ, cæruleæ.

Germen inferum, ovatum, supra truncatum. *Stylus* filiformis, albus, staminibus longior. *Stigma* quadrifidum. *Laciniis* filiformibus crassiusculis.

Bacca (sub superficie bulbi recondita) ovali-oblonga. ½-uncialis, albido-subdiaphana, glaberrima, apice parum attenuata, ibique truncata, subquadrilocularis.

Semina quatuor, unum in singulo locule, oblonga apice attenuata, pulpa glutinosa involuta.

Folia omnia radicalia, oblonga, immerse paucivenosa, crassa, coriacea.

Bulbi parasitici (præcipue in *Melaleuca* . . . . . . Mscr.). *Tuber* subrotundo-puriforme [pyriforme], non vero obtuse angulatum, fuscum, verrucosum, verrucis spinulosis sæpe magnitudine capitis humani, interne carnosum, albidum. *Formis* . . . . nidum præbens; hæ enim per totam substantiam formant ambulacra & cellulas labyrinthi instar intricatas; has inhabitant & in intra has soboles suas nutricantur. Et hæc nullo detrimento radicis! Nidus Germinans *Rumph. Amb. 6, p. 119, t. 55, f. 2.*

The admirable drawing of this plant which John Frederick Miller made in 1773 from Sydney Parkinson's sketch corresponds so entirely with the figure of *M. Beccarii* Hook. f. that there can be no doubt as to the identity of Banks's plant with that species—an identity which is confirmed by Sir Joseph Hooker, who has seen the drawing. The sketch is endorsed in Banks's hand "Endeavours River," and this is important, as no specimens seem to have been preserved, nor do I find any reference to them in any of the Banksian or Solandrian MSS. or lists of the collections, unless, as I suspect, the entry "Ant's Nest" at the end of one of the rough lists of the plants of the voyage refers to the *Myrmecodia*. It is strange that so remarkable a plant was not selected for engraving, but neither plate nor engraving exists.

We have in the British Museum Herbarium a fine specimen of a *Myrmecodia* collected on Jobie Island—the home of many species of *Myrmecodia* and *Hydnophytum*—by George Barclay on the voyage of the *Sulphur* in 1840. I had hoped that this would prove to be new, but the leaves agree so exactly with those of the authentic specimens of *M. salomonensis* in the Kew Herbarium that I have no hesitation in referring it to that species. Beccari, however, saw no flowers, and as these occur on Barclay's specimen, I append a description, which Mr. Rendle has kindly drawn up for me. We have also a flowerless specimen from New Ireland (Barclay) which seems to me different from any of those figured in *Malesia*, and to be probably new; but only the intimate knowledge of the genus possessed by Prof. Beccari can justify the description of novelties from such imperfect material, and I therefore leave it.

"M. SALOMONENSIS Becc. Flowers crowded in axillary clusters among a dense dark ferruginous ramentum. Perianth tubular, 11 mm. long, constricted just above the middle, limb 4-fid, segments triangular-ovate, with a sharp spreading apex. Stamens 4, subsessile at the constriction of the perianth, with alternating tufts of short white hairs; filament scarcely 1 mm. long, anthers scarcely 1·5 mm., connective not produced. Style 7·5 mm. long, thickening below the equally bifid stigma.—A. B. R."

Barclay notes on his ticket: "This plant has a large tuberous root. The flowers are white, and in some of them I found 4 stamens, but not universally so. It seems to prefer airy situations, as it is found only upon trees in exposed habitations" (*sic*).

THOMAS HICK.

[WE are indebted to the Editor of the *Naturalist* for the loan of the excellent portrait of Mr. Thomas Hick which appeared in that Journal for March. A short notice of Mr. Hick appeared in last year's *Journal of Botany*, p. 488, but Mr. F. Arnold Lees's appreciation in the *Naturalist* contains information additional thereto, and we therefore reproduce it with the portrait. The remarkable literary style of the memoir cannot fail to lend the charm of variety to pages which, we fear, are apt to be dull: and we hope our readers will appreciate and understand it.—ED. JOURN. BOT.]

ANY retrospect I may attempt of a life of fifty-six years so remarkable in its lesson as a triumph of mind over matter—though the subject of it called himself a materialist very nearly, if not quite, to the last—must be inadequate; for, though I am almost the one oldest scientific friend of his left—Prof. W. C. Williamson, Dr. Spruce, James Abbot, and James W. Davis, all no more!—I only knew Thomas Hick at all intimately, or saw him constantly, during the lustrum 1868 to 1873. I moved about much after that, whilst he, leaving Leeds for Harrogate, where he resided up to 1885, then migrated to Manchester upon his attaining the Assistant-Lectureship in Botany at Owens, under Williamson. For a civilian his was a battleful life, full beyond the average in controversial effort and strenuous inquiry. As a biologist, where Huxley led he followed; the method, fidelity to truth, fearlessness in experiment and controversy of that Wellington in the esoteric fields of Cosmos, ever evoking his profoundest admiration and faith.

As a boy, of humble but respectable parentage, Hick was originally destined for manual labour; but what one may be forgiven for calling a lucky accident in the mill where he first went to work involved an injury to his left hand and loss of some fingers. This led him to become a pupil, a teacher, and eventually head master of the Lancasterian School at Leeds. When I first knew him he was studying, with more or less definite ideas, for the Degrees he afterwards attained. Science-teaching in schools was then coming to the front as a necessary in the curriculum of middle-class education; and in the late sixties and early seventies he upheld the banner of nature-study by giving to others in night-classes at the Leeds Mechanics, at Bradford, and elsewhere, a sufficiency of that knowledge on plant life which a more spontaneous curiosity and enthusiasm had led him to seek after for himself. Much of the best work of his life was done in this way, infecting others by his

force of character and graphic aptitude in expressing what he knew; before he had accomplished any of what it is the custom to style 'original' investigation—definite little secrets wormed by tireless observation from the Grand Arcana of Life.

Awakening interest in botany, for my early love like that of many another youth (Hick being seven years my senior) was entomology and ornithology, first brought me into contact with him in 1868. He, William Todd, and James Abbott were already concerned with problems in geology and theology cognate to life, and soon after we had 'kidneyed' to one another, Huxley delivered himself of that famous Edinburgh address on 'The Physical Basis of Life,' which stirred up into a blaze the smouldering clerical animosities which Darwin had, in another form, first raised with his 'Origin of Species,' some seven years previous. Early in 1870, Hick along with Todd, James W. Davis, Abbott, W. Watson, (another schoolmaster), and myself, formed ourselves into a small Mutual Improvement Society, meeting fortnightly at our homes in turn to read papers and discuss points in Science Progress. This, which we dignified by the name of the Leeds Scientific Association, was, I believe, in part the origin of the Leeds Naturalists' Society. Before that, for years, the nature-students of Leeds, mainly working-men whom the 'Philosophical' gentlemen of the time in no way recognised, used to meet at a Hall or Museum behind the present Corn Exchange. Davis and Hick first met there, Todd being their introducer. None of the friendships there formed with Hick were, I think, ever broken or even strained, Hick and Davis's characters being equally unjealous, earnest and sterling. For some years Hick was the reviewer of science books for the 'Leeds Mercury,' and many of his trenchant and well-informed critiques are remembered yet, notably that on 'As Regards Protoplasm'—a reply to Huxley's 'Lay Sermon,' by Hutchison Stirling. Hick's first original paper, about 1880, was, I recollect, on an overlooked point in the morphology of *Ficaria verna*. It showed an unusual gift of exact observation, and foreshadowed the brilliancy of later papers in the 'Journal of Botany' on the Continuity of Protoplasm in the tissues of certain Marine Algæ. He was too careful and self-critical a worker to produce voluminously; albeit his later researches in the field of Fossil Botany at Manchester, for which more credit is his due than any mere list of his *obiter dicta*, as the *Aide* of a rather jealous Chief would seem to warrant, must prove a sufficient and enduring monument.

Thomas Hick was a singularly simple-minded, unaffected, transparently-honest Yorkshireman; strangely little exalted for one with such a gift of brain. His lectures were always marvels of lucidity and arrangement. A trifle blunt of speech and never quite losing his Yorkshire accent, he was respected by who listened to him, and loved by who knew him socially. Very matter-of-fact most people would have said, yet, at times, I am reminded, a vein of sentiment (as mayhap is the case with most of us) occasionally shewed itself running through the solid strata of his mental organism. If this seems to belie,—to be at variance with outspoken materialism, we may reflect that, as yet, no scientific analysis of spirit has been made. This sensibility to the beauty of faith or feeling came to the surface at times in a moistened eye or a phrase spoken with 'bated' breath, and unexpectedly: who shall say that whatever arouses it has *not* its source in a fact, for which science, on its present plane, has no precise terms? I would not wrong by a tittle so fine a character as Hick's in the memories of those near, and while he lived, dear to him; but I would not have it understood that my summed-up impression of him was aught other than one of Appreciation; and a Recognition of the singular stability and depth of his conviction, often reiterated to those mentally sib, that Matter was All, and all Matter, subject to partly unrevealed laws of Cosmical Evolution; and that Mind, Soul, Spirit—whichever we term it—though possibly more than a mere property of matter known as yet by certain relations to it, was equally an evolutionary essence, probably subject to similar or parallel laws as yet incapable of formulation by a faculty which has not yet attained the acme of Possibilities. Hick had, years ago, more than a glimpse of that 'Natural Law' of 'sympathetic relationships' in a 'Spiritual World' which has in recent years found tentative expression in such Physico-psychologic as that of Drummond and Joseph Morris. The motto of Who would be wise and true to Nature, for maybe ages yet, must be—Enquire, Observe, Ponder, re-enquire, re-observe, re-study, marking off precisely and reverently the eminences we each of us reach, suspending any 'final judgment' till in our turn *apud plures*. What more can we do than honestly strive To Know, or cease to be—the end of dormance of faculty—what we May Be, with a fool's cry 'We are at the End!' Beautiful World! beautiful gift of Brain to comprehend it! are they not worth any effort, while environment forbids not? The spirit of Thomas Hick seems, as I hold the pen, to inspire me to embody this, his life's creed, in words. It should offend no one's susceptibilities, for it was in him, and for all who live by it will be, manful, soulful, honest, and without fear.

F. Arnold Lees.

EUPHRASIA SALISBURGENSIS Funk., IN IRELAND.

[The following interesting account of *Euphrasia Salisburgensis* bears so intimately upon the contributions to its history which have already appeared in this Journal that we have asked and obtained permission from the Editors of the *Irish Naturalist* to transfer it to our pages. It appeared in the number for April last.—Ed. Journ. Bot.]

In the *Journal of Botany* for November last attention was drawn to the Irish forms of *Euphrasia* by the publication of an instructive paper from the pen of Mr. F. Townsend, an acknowledged authority on this difficult genus. In this paper *E. Salisburgensis* Funk., an alpine or subalpine species of wide range on the European continent, is recorded as an addition to the Irish flora on the faith of specimens gathered by the Rev. E. S. Marshall on the shores of

Lough Mask, Co. Mayo, in July, 1895. The Lough Mask plant, as figured by Mr. Townsend in the plate which adds so much to the value of his paper, is obviously far from typical, but from a note in last month's issue of the *Journal of Botany* it appears that Messrs. H. and J. Groves have discovered amongst material collected in 1892 near Menlough, in Co. Galway, specimens which Mr. Townsend considers much closer to the continental plant. An elegant, slender-stemmed *Euphrasia*, gathered by myself in August, 1895, near Ballyvaughan, Co. Clare, where it grows in abundance on limestone crags, has since been kindly examined by Mr. Townsend, who unhesitatingly refers it to *E. Salisburgensis*, and informs me that it is similar to the Menlough plant.

This interesting *Euphrasia* is thus shown to range over a considerable area on the low-lying limestone tracts of West Ireland; but it cannot justly be regarded as a recent addition to our flora. The plant, in fact, was gathered in Ireland so long ago as 1852, and was recorded as Irish, under another name, in the *Cybele Hibernica* in 1866. We find it first referred to in the following passage from a paper by Daniel Oliver published in the *Phytologist* for 1854, and describing a botanical tour made in Ireland two years earlier:—

> "*Euphrasia* ——? On Aran I collected a curious little form, some three inches in height, much branched from the base; stem with a minute, adpressed pubescence; lanceolate or lanceolate-oblong leaves, with one, two, or three strong teeth on each side. I did not know to what species or form to refer it; but, examples being sent to C. C. Babington, he kindly informs me that he thinks it a form of the *E. gracilis* of Fries, although it strikingly resembles, and possibly may be, *E. Salisburgensis*."*

Two years later, in the *Scottish Gardener* for 1856, the same plant, this time under the name *E. gracilis* Fries, was recorded by the late Mr. A. G. More from the limestone district of Castle Taylor and Garryland, Co. Galway. The finder, however, appears to have been dissatisfied with the naming of his plant, for four years later, in his paper "Localities for some Plants observed in Ireland,"† we find this further reference to it:—

> "*Euphrasia gracilis* seems to belong rather to *E. Salisburgensis*; in either case it is the *E. nemorosa* of Grenier and Godron. But the Garryland (and Aran) *Euphrasia* differs much from what I have gathered as *E. gracilis* on the heaths and downs of Kent. This latter is apparently the *E. ericetorum* of Jordan; but I do not suppose that either is specifically distinct."

It appears clearly, from More's correspondence about this time with his friends the Rev. W. W. Newbould and Professor Babington, that he was strongly inclined to refer his Castle Taylor plant to *E. Salisburgensis*, and that he refrained from adopting that name only in deference to the opinion of the distinguished author of the *Manual of British Botany*. Through the kindness of Miss More I am enabled to make the following interesting extracts from her brother's correspondence in illustration of this point. The MS.

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* Vol. iv. p. 679. † *Nat. Hist. Review*, vii. p. 434.

draft of the paper just quoted from had been submitted by More to Newbould with the name *E. Salisburgensis* set down for the Garryland *Euphrasia*, whereupon Newbould thus writes under date April 9, 1860:—

> "*Euphrasia Salisburgensis.*—I would not use this name unless you were quite sure the plant was the Continental one. If I rightly remember, you showed me the plant, and it was identical with one I gathered on the border of Loch Neagh. This plant, I thought, was not *E. Salisburgensis*, but *E. officinalis* of Koch, approaching as nearly as possible to *E. Salisburgensis*, and on mentioning this to Babington, I found that he had independently come to precisely the same conclusion."

Shortly before this, March 19, 1860, Babington, in reply to inquiries from More, had written:—

> "I do not find that I have any *Euphrasia Salisburgensis* or any other from Garryland. I have what I believe to be it from the great Isle of Aran.* I have given up *gracilis*, and think that if we are to split here we must take the French view of them and leave *officinalis* and *nemorosa* to correspond with Boreau's groups, *Calyce glanduleux* and *Calyce non-glanduleux*."

And, finally, after examination of More's specimens, Babington writes, April 17, 1860:—

> "I certainly think that your *Euphrasia* is the same as mine from Aran. It comes very near to *Salisburgensis*, although the true Continental plant has even more deeply jagged leaves than this. I am not inclined to separate the plant [*E. officinalis*] into segregate species."

Still dissatisfied with the uncertainty as to his Galway *Euphrasia*, More, in the following year, 1861, sent a sheet of specimens through his friend J. G. Baker to M. Boreau, author of the *Flore du Centre de la France*, by whom they were identified as *E. cuprea* Jord. Under that name both the Castle Taylor and the Aran Island plants were recorded in *Cybele Hibernica* (1866) as a form of the aggregate *E. officinalis* which Babington thought it inadvisable to "split."

The precise value to be given to Jordan's specific distinctions must depend on the greater or less development of the analytic faculty in the individual student. To many otherwise gifted botanists the true analytic vision is denied; they lack that instinct of discrimination which has enabled M. Jordan in his *Espèces végétales affines* to evolve 200 species from the *Draba verna* of Linnæus, and for such as these *E. cuprea* will remain a mere phase of *E. Salisburgensis.* Others may with Nyman rank it as a subspecies, others again with Gunther Beck as a variety, and so on through all the dwindling gradations from species down to "state." As for myself, having compared the Castle Taylor specimens named *E. cuprea* by Boreau† with those from Ballyvaughan, I can find no distinction of any importance. Some of the Castle Taylor specimens in their narrower leaves and more truly filiform stems and branches appear to approach closer to typical *E. Salisburgensis* than the plant from Ballyvaughan, while in the latter the more aristate toothing of the bracts comes closer to the type.

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* Probably some of Oliver's 1852 specimens.

† To one of these specimens is appended the following note in the handwriting of the late A. G. More: "Seen by Bab. same as Aran Isles" [specimen?].

In short, the late Mr. More's Castle Taylor plant of 1854 has as good a title to a place under *E. Salisburgensis* Funk. as those from Menlough and Ballyvaughan, and has certainly a better title to that position than the plant from Lough Mask. It was simply in deference to Babington's objection to split *E. officinalis* that the Castle Taylor plant was not recorded with the dignity of a new Irish species or subspecies some thirty-six years ago; and that the plant was finally published in *Cybele Hibernica* as *E. cuprea* rather than as *E. Salisburgensis* was due to M. Boreau's refinement on Mr. More's diagnosis. He who records the segregate necessarily records the aggregate, and the relation between *E. cuprea* and *E. Salisburgensis* is that of segregate and aggregate.

The Irish distribution of *E. Salisburgensis* appears to be exclusively low-level. The stations Inishmore (Aran), Castle Taylor, Lough Mask, Lough Corrib (Menlough), and Ballyvaughan, all lie within 100 feet of sea-level, and if further observation should show that it occurs, as Newbould suspected it did, on the shores of Lough Neagh, then its descent to a level of fifty feet would be established.

Nathaniel Colgan.

SHORT NOTES.

Corrections (see p. 129, footnote).—Mr. Jackson rightly points out that Poiret's signature occurs at the end of the article on "Mussenda" in Lamarck's *Encyclopædia*, and that his citation of *M. ægyptiaca* as of Poiret is therefore correct. In the footnote on p. 129, "1895" should be "1896."—James Britten.

Isle of Man Plants.—On p. 76 Mr. Arthur Bennett makes allusion to an "interesting anonymous paper on the Isle of Man Flora in the *Phytologist*, iv. n.s. 161–169 (1860), dated from Christ's Church Parsonage, Maughould, Isle of Man." This paper was written by Rev. Hugh A. Stowell, as stated by himself in Thwaites's *Isle of Man* (Sheffield Publishing Company, 1863). Several pages of this book are devoted to some particulars of what was then known of the fauna and flora of the island, and, though bearing evidence of the absence of any attempt at proper revision, the facts stated seem to have been obtained from sources that, to a great extent, may be considered trustworthy. To those pages Mr. Stowell supplied a prefatory note, in which he says:—"The 'Notes on the Flora' (Phenogamous) are in like manner an abridgement of a paper contributed by myself to the *Phytologist* of June, 1860." The short article on the mosses, by myself, in *Phytologist*, 1857, mentioned by Mr. Bennett, which appears to have been the earliest contribution to the bryology of the island, contained an enumeration of only 113 species, to which, shortly afterwards, fifteen species were added on the authority of Mr.

Stowell and that of my old-time friend and frequent correspondent the late Dr. B. Carrington. In more recent years the island has been bryologically explored at various times, mainly by Mr. G. A. Holt, and that with so much thoroughness that the list of mosses had been increased in 1882 to 232 species. The aggregate result of the bryological investigations of the island is given in a most exact and valuable paper by Mr. Holt, "A List of Mosses in the Isle of Man, 1882," published in the *Transactions* of the Isle of Man Natural History and Antiquarian Society, 1888; a list which also should not be lost sight of in the event of any future projected Flora of the island.—J. H. DAVIES.

NOTICES OF BOOKS.

An Illustrated Flora of the Northern United States, Canada, and the British Possessions from Newfoundland to the Parallel of the Southern Boundary of Virginia, and from the Atlantic Ocean westward to the 102nd Meridian. By NATHANIEL LORD BRITTON, Ph.D., Emeritus Professor of Botany in Columbia University, and Director-in-Chief of the New York Botanical Garden, and Hon. ADDISON BROWN, President of the Torrey Botanical Club. The descriptive text chiefly prepared by Professor Britton, with the assistance of Specialists in several Groups; the figures also drawn under his Supervision. In three volumes. Vol. I.: Ophioglossaceæ to Aizoaceæ—Ferns to Carpet Weed. New York: Charles Scribner's Sons. 1896. Pp. xii, 612.

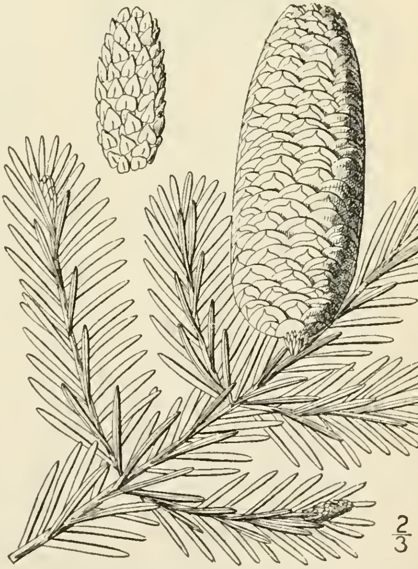
PROF. BRITTON is entitled to the gratitude of botanists for the admirable work of which this is the first instalment. A concise flora, brought up to date, complete, and illustrated, containing an account of North American plants not too elaborate nor too learned for the amateur, and yet sufficiently complete and scientific for the student, has long been a desideratum. In saying this we are in no way disparaging Asa Gray's admirable *Manual*, which, as an easily portable volume, will always have claims on the field botanist; but Prof. Britton's book cannot fail to be regarded as a more complete and comprehensive manifestation of the North American Flora. We call it "Prof. Britton's book," because, as we learn from the preface, the claims of Judge Brown to recognition are of a somewhat shadowy description, and although in a few cases specialists have contributed the descriptions of certain groups, the plan and execution of the work as a whole is his. Mr. L. M. Underwood has undertaken the Ferns and Fern Allies; Dr. Morong the *Naiadaceæ*, *Orchidaceæ*, and some smaller orders of Monocotyledons; Mr. F. V. Coville the *Juncaceæ;* Mr. J. K. Small the *Polygonaceæ*; while the assistance of Mr. G. V. Nash in the *Gramineæ* is acknowledged.

The main plan of the book corresponds largely with that of

Bentham's *Illustrated Handbook*, which seems to have suggested it. But in certain small points an advance upon the model is to be commended: thus Prof. Britton gives a reference to both place and date of publication of every name cited—an immense convenience, which we have always hoped to see adopted by the writers of our British floras; and the comma which English and American botanists usually insert between the name and the authority has disappeared. The descriptions are short but clear; there is a certain amount of synonymy; and the illustrations, if not as good as Fitch's, are very helpful. As, by Prof. Britton's kindness, we are able to give examples of these, we print with them the accompanying text, and thus enable our readers to see how the book is arranged.

"**Abies balsamea** (L.) Mill. Balsam Fir.
Pinus balsamea L. Sp. Pl. 1002. 1753.
Abies balsamea Mill. Gard. Dict. Ed. 8, No. 3. 1768.

A slender forest tree attaining a maximum height of about 90° and a trunk diameter of 3°, usually much smaller and on mountain tops and in high arctic regions reduced to a low shrub. Bark smooth, warty with resin 'blisters.' Leaves fragrant in drying, less than 1″ wide, 6″–10″ long, obtuse, dark green above, paler beneath, or the youngest conspicuously whitened on the lower surface; cones cylindric, 2′–4′ long, 9″–15″ thick, upright, arranged in rows on the upper side of the branches, violet or purplish when young; bracts obovate, serrulate, mucronate, shorter than the broad rounded scales.

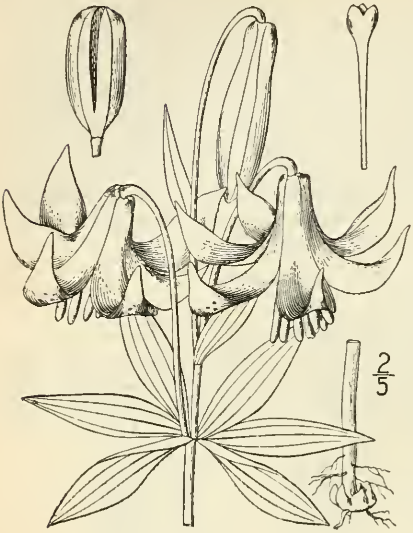


Newfoundland and Labrador to Hudson Bay and the North-west Territory, south to Massachusetts, Pennsylvania, along the Alleghenies to Virginia, and to Michigan and Minnesota. Ascends to 5000 ft. in the Adirondacks. Wood soft and weak, light brown; weight per cubic foot 24 lbs. Canada balsam is derived from the resinous exudations of the trunk. May–June."

"**Lilium Canadense** L. Wild Yellow Lily. Canada Lily.
Lilium Canadense L. Sp. Pl. 303. 1753.

Bulbs subglobose, 1′–2′ in diameter, borne on a stout rootstock, composed of numerous thick white scales. Stem 2°–5° tall, slender or stout; leaves lanceolate or oblong-lanceolate, verticillate in 4's–10's or some of them alternate, acuminate, 2′–6′ long, 3″–15″ wide, finely roughened on the margins and on the veins beneath; flowers 1–16, nodding on long peduncules; peduncules sometimes bearing a small leaf-like bract; perianth-segments 2′–3′ long, yellow or red, usually thickly spotted below, recurved or spreading, not clawed; capsule oblong, erect, 1½′–2′ long.

In swamps, meadows, and fields, Nova Scotia to Ontario and Minnesota, south to Georgia, Alabama, and Missouri. Ascends to 6000 ft. in North Carolina. Red-flowered forms with slightly spreading perianth-segments resemble the following species, and forms with strongly recurved segments. L. superbum. June–July."



We are not going to raise for discussion points of nomenclature, but we think our readers may like to know the rules which (for the present) are adopted by a large number of American botanists. With some of them we are in entire accord; others are open to discussion; some we think undesirable, and we doubt whether they are likely to be generally adopted. We cannot think botanists will endorse the action by which the well-known *Koenigia* of Linnæus is set aside in favour of the brand-new *Macounastrum*—merely because Adanson had a name *Konig*, which has never been taken up—although such action may be a legitimate outcome of the application of Rules 5 and 8. Nor can we regard Rule 10 as of equal importance with the rest, although it covers Dr. Britton's action in preferring *Tissa* to *Buda*, under circumstances which will be familiar to our readers.

The Rules are as follow:—

"*Rule 1.*—Priority of publication is to be regarded as the fundamental principle of botanical nomenclature.

"*Rule 2.*—The botanical nomenclature of both genera and species is to begin with the publication of the first edition of Linnæus' *Species Plantarum* in 1753.

"*Rule 3.*—In the transfer of a species to a genus other than the one under which it was first published, the original specific name is to be retained.

"*Rule 4.*—The original name is to be maintained whether published as species, subspecies, or variety.

"*Rule 5.*—The publication of a generic name or a binomial invalidates the use of the same name for any subsequently published genus or species, respectively.

"*Rule 6.*—Publication of a genus consists only (1) in the distribution of a printed description of the genus named; (2) in the publication of the name of the genus and citation of one or more previously published species as examples or types of the genus, with or without a diagnosis.

"*Rule 7.*—Publication of a species consists only (1) in the distribution of a printed description of the species named; (2) in the publishing of a binomial, with reference to a previously published species as a type.

"*Rule 8.*—Similar generic names are not to be rejected on account of slight differences, except in the spelling of the same word.

"*Rule 9.*—In the case of a species which has been transferred from one genus to another, the original author must always be cited in parenthesis, followed by the author of the new binomial.

"*Rule 10.*—In determining the name of a genus or species to which two or more names have been given by an author in the same volume, or on the same page of a volume, precedence shall decide."

Among the alterations in nomenclature are a few which affect our British list. This will, we fear, distress our good friend Mr. Clarke; but it seems probable that in the next *London Catalogue* the following changes will be necessary[*]:—

Juncoides Adans. (1763) for Luzula DC. (1805).
Unifolium Adans. ,, ,, Maianthemum Wigg. (1780).
Gyrostachys Pers. (1807) ,, Spiranthes L. C. Rich. (1818).
Peramium Salisb. (1812) ,, Goodyera Br. (1813).
Savastana Schrank. (1789) ,, Hierochloe Gmel. (1747).
Dondia Adans. (1763) ,, Suæda Forsk. (1775).

Suæda maritima becomes *Dondia maritima* Druce—a name which Mr. Druce published in his much-criticised paper in the *Annals of Scottish Nat. Hist.* for 1896. We demur, however, to the supersession of *Elodea* Michaux (1803) by *Philotria* Raf. (1818), which is rendered necessary by the application of Rule 8; and we cannot think that botanists will agree to accept Rule 5, under which we suppose it is that *Narthecium* becomes *Abama*. We think some hesitation is justifiable as to the adoption of *Leptorchis* Thouars in place of *Liparis*. Prof. Britton refers to "Nouv. Bull. Soc. Plilom. [*sic*] 314," meaning 317, where Thouars spells the name *Leptorkis*, but excludes the two American species (one of which is *L. Loeselii*) from it. Kuntze adopts the name, and, *more suo*, sweeps into the genus a vast number of species by the simple process of substituting *Leptorchis* for *Liparis*. On the other hand, Jackson does not recognize the genus, and we believe there is some doubt as to the actual position of this and the other names given by Thouars.

We are sorry that Prof. Britton has felt compelled to yield to "the general desire" for what are called "English names," and regret still more that a mistaken purism leads him to reject so old a name as "Dog's-tooth Violet" for *Erythronium*, on the ground that it "is calculated to mislead as to the nature of the plant." He even goes so far as to say "the species are *erroneously* called Dog's-tooth Violet," although the name goes back at least as far as Gerard, and no other plant has borne it: "Adders-tongue" is preferred, although *that* is also given (as is usual) to *Ophioglossum*. "Assiniboia Sedge," "Hair-grass Dropseed," "Scirpus-like Sedge," "Large-tubercled Spike-rush," "Knieskern's Beaked Rush," are samples of what are supposed to be "English names."

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[*] Another may be mentioned here: *Damasonium Alisma* Mill. (Dict. 1768) antedates *D. stellatum* Thuill. (1799).

A word must be said in praise of the typographical arrangement and excellent printing. The paper, too, for those who do not dislike a shiny surface, is very good, although somewhat heavy.

We trust that this *Flora* will proceed apace to its completion, and we cordially recommend it to those of our readers who are interested in North American plants.

James Britten.

U. S. Department of Agriculture, Division of Agrostology. Bulletins Nos. 4 & 5. Washington, 1897.

The first of these publications is a pamphlet, of forty-three pages, with five plates, and fifteen figures in the text, entitled "Studies on American Grasses." The work is chiefly that of Mr. Lamson-Scribner, the Government Agrostologist, and, being purely of systematic interest, would have seemed hardly likely to commend itself to a government department. It contains (1) a restoration of Schlechtendal's genus *Ixophorus*; (2) a list of the grasses collected by Mr. Palmer near Acalpulco, Mexico, 1894–95, with the description of a new genus, *Fourniera*, of the tribe *Zoysieæ*; (3) a list of grasses collected by E. W. Nelson in Mexico, 1894–95, with several new species; (4) results of the examination of some American Panicums in the Berlin Herbarium and that of Willdenow by Theo. Holm; (5) analytical keys to the species, and notes on the native and introduced members of the genera *Hordeum* and *Agropyron*, with the description of no less than nine new species and thirteen new varieties in the latter genus; (6) miscellaneous notes and descriptions of new species.

In papers 3, 5, and 6, Mr. Scribner is associated with Mr. Jared G. Smith. There are fifteen figures in the text, and five plates, none of which call for praise. If a thing is worth a plate, it is surely worth the expenditure of sufficient trouble to make it more than a rough sketch; and this criticism might be extended to other American publications.

Future work must settle the value of the new species; the descriptions, at any rate, are fairly comprehensive. We must, however, enter two protests. The first against the use of the trinomial; trinomials are, in fact, in some pages almost as frequent as binomials. The second in reference to Mr. Scribner's new name *Chætochloa*. This, if you please, is only the well-known genus *Setaria*, which has become "untenable," first because "at an earlier date the name was employed by Acharius to designate a genus of lichens"; and, second, because it was first applied by its founder Beauvois to a species of *Pennisetum*. With the help of Mr. Gepp I have looked up the lichen point, and find that Acharius described *Setaria* in *Nova Act. Reg. Acad. Sc. Suec.* xv. (1794), and repeated it in his *Lichenograph. Prodr.* (1798) (p. 219). Twelve years later, however, in his *Lichenograph. Univ.* (1810), p. 120, he replaced it by *Alectoria*, giving no reason for the change, and the second name has been universally adopted by lichenologists. Here, then, is a good chance for somebody to trot out all the subsequently described species of *Alectoria* under the name *Setaria*, which, without doubt, has priority!

As regards Mr. Scribner's first reason, we see that it holds if we consider that a seed-plant and a lichen cannot have the same generic name. As regards the second reason for getting rid of *Setaria*, "its first application to a species of *Pennisetum* places it at once among the synonyms," this is a bad piece of book-work, and illustrates the great danger of rushing out new genera without even working up the literature. If Mr. Scribner had been revising the genus—and we think that only under such conditions has a man any right to make a wholesale change in the names of the species—he would probably have found his opening statement inaccurate. He says the name *Setaria* "was first applied by Beauvois (in Oware and Benin) to a species of *Pennisetum*." Now, as a matter of fact, although the volume in question (Beauvois' *Fl. d'Oware et Benin*, vol. ii.) bears the date 1807 on its title-page and 1810 on its cover, part of it at any rate was not published till after 1810. There are frequent references to names published in Brown's *Prodromus* (1810), but what makes it especially bad for Mr. Scribner's reputation as a bibliographer is that at the place in question (ii. 80), immediately following the name *Setaria* we read "*Setaria Ess. d'Agrost.*"*!* It looks as if Mr. Scribner had not even troubled to refer to the description of the genus which he is so anxious to re-name. If we refer to Beauvois' *Essai d'Agrostographie*, we find (p. 51) "*Setaria* nob.," followed by a description and an enumeration of those species of *Panicum* (including *glaucum*, *italicum*, *verticillatum*, and *viride*) which the author considered to belong to his genus. There is no reference to the *Flore d'Oware et Benin*, nor to the species, *S. longiseta*, which is described on p. 80. On p. 70, under *Saccharum*, is another reference to the *Essai*, in which the number of the page and that of a figure and plate are cited, so that it seems pretty clear that, whatever the date on the cover of the larger work, part, at any rate, and that the part now in question, did not appear till after the *Essai* (1812), and that the first description of *Setaria* as a genus of grasses represents NOT *Pennisetum*, but what is now, and has been for years, understood by Beauvois' name.

Bulletin No. 5 is "A Report upon the Grasses and Forage Plants of the Rocky Mountain Region," by P. A. Rydberg & C. L. Shear, and contains forty-eight pages, with twenty-nine figures in the text. The figures are as poor and of as little value as those in the former Bulletin. The matter, which includes certain field notes and general observations on the value of the plants from an economic point of view, better represents the work of a department of agriculture than the "Studies."

A. B. RENDLE.

Flora de Chile. Por Dr. C. Reiche & Dr. F. Johow. Bajo la co-operacion del Prof. F. Philippi. Santiago, 1895-6. 8vo. Parts I. & II.

It is now nearly sixty years since the first volume of Claude Gay's *Flora of Chili* was published, consequently the present work is one which is much needed, and one which ought to be of great service to students of the flora of this highly interesting country. Both the authors are previously known to botanists. Dr. C. Reiche has given us a careful revision of the Chilian species of *Viola* and of *Oxalis*,* and Dr. Johow has quite recently published his *Estudios sobre la Flora de las Islas de Juan Fernandez*, containing an account of the vegetation of these well-known islands, this latter being specially interesting, inasmuch as nearly half of the flora is endemic and contains many remarkable species.

The territory included by the present "Flora de Chile" extends from 18° S. lat. to Cape Horn, and from the Pacific Ocean to the adjoining Republics; it will thus be seen that the country included varies, from possessing a climate where there is practically no rainfall at all, to one where the annual fall is considerable. The vegetation in the north is very limited, and we can gain a fair idea of the curious character of the flora of these desert districts from the account of Dr. F Philippi's travels in the province of Tarapaca,† and from his father's, Dr. R. Philippi's, *Florula Atacamensis*, in which latter work the author enumerates scarcely four hundred species. In some of the valleys, for instance, near Copiapo, years pass over without rain falling at all; but dews are frequent. Farther south showers are only occasional, sometimes after an interval of three years; in the vicinity of the river Biobio, Dep. Conception, rains fall regularly in winter, and south of this river the rains are irregular but fall heavily. Trees are absent in the north, but the southern forests contain a variety of excellent timber. The authors of this Flora have been fortunately enabled to work through the material collected by the Drs. Philippi in the National Museum, without which, indeed, the work would have been impossible. This can be easily seen by glancing at the Catalogue issued by Dr. F. Philippi in 1881,‡ which contains an enumeration of 5358 vascular plants, a large percentage being his own species or those of his father.

The first part of the present work carries us to the end of *Capparidaceæ*, the second part from *Flacourtiaceæ* to *Coriariaceæ*: thus included in the volumes we have several genera treated of, which are peculiarly interesting in Chili for one of two reasons. Either, as in the genus *Cristaria*, in *Malvaceæ*, nearly all the species are endemic, or, as in *Ranunculus*, *Viola*, *Silene*, *Cardamine*, *Malvastrum*, and *Oxalis*, the genera are widely diffused, but a large proportion of the Chilian representatives are endemic.

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* *Violæ Chilenses.* Engler's *Jahrbuch*, xvi. pp. 405–452. "Zur Kenntniss der chilenischen Arten der Gattung *Oxalis*." Engler's *Jahrbuch*, xviii. pp. 259–305.

† *Verzeichniss auf der hochebene der Provinzen Antofagasta und Tarapaca.* 1891.

‡ *Catalogus Plantarum vascularum Chilensium.* Dr. F. Philippi. 1881.

The general get up of the work leaves a good deal to be desired. For a publication of this importance better paper should have been used, and here and there more careful editing is certainly necessary. Prefixed to each of the genera we have an analytical key, which is of considerable assistance in the identification of the species and which was wanting in Gay's *Flora*. Occasionally these keys seem to want rather more care bestowed upon them: thus, on p. 215, in the genus *Palava*, the fourth species with "Hojas superiores bipinnatifidas," surely ought to be "dissecta" and not "pinnatifida." The authors do not retain the original spelling, *Palaua*, in place of the more recent *Palava*, the genus being named in compliment to Antonio Palau y Verdera, a professor of botany at Madrid. We doubt the advisability of transferring *Malva Reichei* Phil. to *Sida;* and we also doubt whether *Anoda? strictiflora* Steudel is really a species of *Anoda*. It is founded on Bertero No. 406. When in Paris, a year or two ago, we were enabled, through the kindness of Mons. Drake del Castillo, to see a portion of Steudel's herbarium, and the specimen there (Bertero, No. 406) was certainly either identical with, or very closely allied to, *Modiola multifida* Moench. There may, however, be more than one plant bearing this number. We are glad to see the authors have adopted a suggestion made some time ago in this Journal, by placing the genus *Tarasa* Phil. as synonymous with *Malvastrum*. There can be little doubt that this is its correct position. The authors have not dealt with quite all the plants about which information is desirable. In *Malvaceæ*, for instance, what has become of *Cristaria? Vidali* Phil., *C. hastata* Phil., *C. Larranagæ* Phil., *Sphæralcea plicata* Phil., and *S. arenaria* Phil., all species published by Dr. Philippi in 1893, in the *Anales de la Universidad?*

The difference between the present *Flora* and its predecessor of sixty years ago is strikingly shown if we take any large genus such as *Oxalis:* in the older work forty-one species were enumerated, while in the present volume there are ninety.

So many points occur to one in connection with a striking flora like that of Chili, that it is impossible even to mention them in a brief notice. A careful comparison of the Chilian flora with that of the adjoining Argentine Republic has been made by Dr. R. A. Philippi,* wherein the points of similarity and dissimilarity are brought out. Thus in the Argentine we have many natural orders which have no Chilian representatives, and *vice versa:—Menispermaceæ*, *Meliaceæ*, *Olacineæ*, *Magnoliaceæ*, &c., are present in the Argentine but not in Chili; and *Droseraceæ*, *Frankeniaceæ*, *Monimiaceæ*, *Malesherbiaceæ*, &c., are to be found in Chili and not in the Argentine. Curious results are obtained if certain large genera are taken; thus Dr. Philippi states † there are seventy-five species of *Oxalis* in the Argentine and seventy-nine in Chili, while in *Viola* there is only a single species in the Argentine but forty-eight in Chili. We await with interest the completion of Drs. Reiche and Johow's *Flora* of this by no means the least attractive of the South American Republics.

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* "Floras i Faunas de Chili i Argentina," por R. A. Philippi, *Anales de la Universidad*, lxxxiv. entegra 15.

† Dr. Reiche gives ninety species of *Oxalis* for Chili and fifty-three species of *Viola*.

E. G. B.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on April 1st, Dr. Dyer exhibited a series of drawings (on the screen) to illustrate the cultural evolution of *Cyclamen latifolium* Sibth. The species is a native of Greece and the Levant, and is believed to have been first introduced into European cultivation in 1731. In 1768 Miller described a form modified by cultivation under the name of *Cyclamen persicum.* This name was misleading, as, according to Boissier, neither the wild nor the garden form occurs in Persia. The latter persisted in cultivation for about 150 years, and about 1860 became the starting-point of the modern races which were illustrated. *Cyclamen latifolium* has never been hybridized, and it was shown that the striking forms now in cultivation were the result of the patient accumulation of gradual variations. Drawings of the remarkable forms "Papilio," obtained by De Langhe-Vervaene, and of "The Bush-Hill Pioneer," by Messrs. Hugh Low & Co., were shown. It was pointed out that the tendency of the species under cultivation was to lose its distinctive generic characters and to approximate to a more generalized type. The reflexion of the corolla-segments was often lost as in *Lysimachia*, the segments were sometimes multiplied as in *Trientalis*, and the margins were fringed as in *Soldanella* and cultivated forms of *Primula sinensis.* The "Bush-Hill Pioneer" possessed, in the cresting of the petals, a remarkable character without parallel in any primulaceous plant occurring in a wild state. Dr. Dyer also showed a series of plants to illustrate the origin of the garden "Cineraria." It was generally agreed that this had sprung from one or more species native of the Canaries; it will be remembered that a long discussion on this matter appeared in *Nature* some little while ago, in which somewhat conflicting views were expressed. An extreme cultivated form was shown and compared with *Senecio cruentus*, which Dr. Dyer considered all internal evidence indicated as the sole original stock. *S. Heritieri*, another reputed parent, was exhibited; but it was pointed out that this has a shrubby habit and stems markedly zigzag between the internodes, while the leaves are clothed beneath with a dense white tomentum: these characters it transmits more or less to its hybrid offspring. In illustration of this point Mr. Poë's hybrid (*S. super-Heritieri* × *cruentus*) was exhibited (a similar one has occurred at Edinburgh); also the Cambridge hybrid (*S. super-cruentus* × *Heritieri*). *S. cruentus* crosses very freely with the garden Cineraria, and as the latter never exhibits any trace of the characters of *S. Heritieri*, it was concluded that that species had no part in its origin, and that, as in the case of the Cyclamen, the striking development of *S. cruentus* in cultivation was due to the continued accumulation of gradual variations.

NOTES ON SOME RARE SPECIES OF MYCETOZOA.

By Arthur Lister, F.L.S.

Badhamia foliicola, n. sp. A species of *Badhamia* belonging to the group with free spores, which appears to have been hitherto undescribed, was obtained in considerable abundance in Wanstead Park, Essex, in September, 1896. It was found in rather large growths, scattered over an area of several yards, on deeply-strewn dead leaves of sycamore and Spanish chestnut. The sporangia are mostly hemispherical, 0·5–1 mm. diam., sessile and rather crowded; some are pyriform on orange-brown stalks 0·2 mm. long, standing either singly or in clusters of three to six. The colour is dark grey, violet, or softly iridescent in consequence of the membranous sporangium-wall being free from deposits of lime; the grey colour is caused, as seen under the microscope, by reflections from the minutely plicate wall. The capillitium is of the usual *Badhamia* character, forming a network of broad strands, but is almost destitute of lime. The free spores are violet-brown, very minutely warted, and closely resemble those of *B. panicea* Rost. On some of the leaves an orange-brown sclerotium was observed; this revived after being in water for a few hours, and the yellow plasmodium spread over the leaves for a couple of days, when it changed to sessile sporangia similar to those gathered in the Park in all respects, except that the lime in the capillitium was more abundant. Another gathering was obtained on a large heap of dead leaves at Highcliff, Lyme Regis, on 18th February, 1897. The sporangia were all sessile, and grey with an iridescent shot, exactly resembling those found in Essex.

There is a specimen in the Strassburg collection which closely resembles our gatherings in the grey, membranous sporangium-wall and in the broad network of the capillitium almost destitute of lime. The sporangia are sessile on the stalks and refuse skins of grapes. It may be the same species, but in our ignorance of the colour of the plasmodium it is difficult to be certain, for, in common with our gatherings, it agrees in all other characters, except in the habitat, with some limeless forms of *Badhamia panicea* Rost. It was named *Badhamia verna* Rost. = syn. *Physarum vernum* Somf. Accepting the specimen as a type of that species, I suggested that *B. verna* was a form of *B. panicea* (Brit. Museum Catalogue of Mycetozoa, 34). Prof. A. Blytt, of Christiania, has kindly supplied me with part of the original type of *Physarum vernum*, gathered by Sommerfelt in 1827. It is a true *Physarum*, as shown in the description of the species in the sequel, and has no resemblance to our gatherings or to the Strassburg specimen above mentioned. I take this opportunity to correct my suggestion with regard to *Badhamia verna* in the *B. M. Catalogue*.

I propose the name of *Badhamia foliicola* on account of the plasmodium inhabiting dead leaves, and this feature, together with the yellow colour as contrasted with the white plasmodium of *B. panicea*, are the grounds for claiming it as a new species.

B. MAGNA Peck. Mr. F. L. Harvey has sent to the British Museum a specimen of this rare species gathered at Orono, Me., U.S.A., by Mr. C. W. Knight, in October, 1896. The spores differ slightly from those of Peck's type in being more distinctly spinulose under high magnification.

B. DECIPIENS Berk. A specimen of this species has been kindly submitted to me for inspection by Mr. Robert E. Fries, of Upsala. It was found by him in Wermland, Sweden, in 1896, on oak bark; it closely resembles Curtis's type from S. Carolina in the Strassburg collection. This appears to be the second recorded gathering in Europe.

B. RUBIGINOSA Rost. A large form of this species was found at Bryn Dinas Mawddry, North Wales, in Sept. 1895. The sporangia are globose, 0·8 mm. diam., flattened and somewhat umbilicate beneath, on stout cylindrical stalks about 0·5 mm. long. The plasmodium was bright yellow, spreading over moss and rock. An abundant gathering of the usual pyriform type was obtained by Mr. E. S. Salmon in Epping Forest on Nov. 21st, 1896. All the English gatherings of this species I have met with have the spores marked with strong warts or broken bands which distinguish var. *β. dictyospora* from var. *α. genuina*.

PHYSARUM VERNUM Somf. *Plasmodium* probably white. *Sporangia* sessile, more or less crowded, hemispherical or somewhat elongated plasmodiocarps; white, or iridescent from the absence of lime in the sporangium-wall; occasionally seated on a membranous whitish hypothallus. *Capillitium* of numerous small angular white lime-knots connected by many branching hyaline threads. Sometimes the lime-knots are large and branching, or confluent, forming a pseudo-columella. *Spores* spinulose (magnified 1600 times), dark violet-brown inclining to red, 8–12 μ diam.

Hab. On dead leaves and twigs.

Part of the type of this species from Sommerfelt's herbarium, named by himself and gathered at Christiania in May, 1827, has been furnished me by Prof. A. Blytt. It is perfectly matured, but the sporangia are mostly broken, and the white capillitium with its numerous lime-knots projects in little heaps above the ruptured sporangium-wall. Although the lime-knots are usually small and angular, they vary much in size, and are sometimes branched with few connecting hyaline threads, approaching the capillitium of *Badhamia* in form; this circumstance may have led Rostafinski to include it under the latter genus in his monograph as *Badhamia verna*. On the one hand, it is allied to *Physarum cinereum*, which it resembles in the sessile plasmodiocarps as well as in the capillitium; in the latter species we often meet with a capillitium consisting of a network of broad threads charged with lime almost throughout with true *Badhamia* character. On the other hand, it is allied to *Physarum compressum* in the dark spores. We have met with the form during many years. In Epping Forest it is rather abundant on dead holly-leaves. Here the sporangia are most frequently of iridescent-purple colour from the absence of lime in the walls, but others have the walls charged with lime. We have gathered the iridescent form at Lynton, N. Devon, and in Wanstead Park, Essex. At Lyme Regis and also in N. Wales the species occurs with white and usually widely-scattered sporangia, the iridescent form being less common. There are specimens in the Kew collection from Aiken, N. Carolina; Cuba, Madras, and Paraguay, placed under the name of *Physarum cinereum*, which would now be referred to *P. vernum*. But the capillitium usually contains small angular lime-knots filled with large lime-granules 1–2 μ diam., which often coalesce into a vitreous mass. The knots are sometimes large and unite into a pseudo-columella, or, again, the capillitium has the character of *Badhamia*, as in the case of *P. cinereum*, mentioned above. The spores, however, are always constant in their dark colour, and before receiving Sommerfelt's type I had contemplated publishing an account of the form as a dark-spored variety of *P. cinereum*, which is normally characterized by its pale spores; it is satisfactory, however, to be able to trace it to a species already named, for notwithstanding the intermediate place it holds between its two companions, rendering some gatherings difficult to determine, yet the main characters are constant.

P. PENETRALE Rex. I have received a gathering of this *Physarum* from Dr. E. Nyman, who collected it in the Kungsgarten, Upsala, on July 31st, 1895. The species is remarkable in the slender flesh-coloured stalk being prolonged as a columella through more than half the length of the sporangium. The present specimen corresponds in all respects with Dr. Rex's type. This is the third recorded European gathering. The specimen in the Strassburg collection referred to in *B. M. Cat. Myc.* 49, has no locality given, and no name of the collector; this in itself implies that it is not of foreign origin. The other record is British. A small group of nine sporangia on *Jungermannia* on a pine-stick was collected by Prof. I. Bayley Balfour at Moffat about the year 1879, but the identity of the species was not discovered until last year. The sporangia were all mounted in glycerine jelly on two slides; one of these is in the Royal Herbarium, Edinburgh, the other is in my own collection.

P. MURINUM List. Dr. Nyman has furnished me with a specimen of this species, gathered by himself in the Kungsgarten, Upsala, July 31st, 1895. It is the sessile form similar to the specimen from Moffat referred to in *B. M. Cat. Myc.* 42. This is the second recorded European gathering.

P. CALIDRIS List. An interesting form of this species was obtained at Witley, Surrey, in Sept. 1896. The sporangia are nearly all sessile, a few having short stalks with characteristic red colour and translucence. The capillitium is almost of *Badhamia* type, with few hyaline threads; the sporangia are strongly rugose. In the capillitium and sporangium-wall the gathering resembles the type of *P. nodulosum* Cke. & Balf. from S. Carolina, referred to in *B. M. Cat. Myc.* 52. An extensive gathering near Amesbury, Wilts, in Aug. 1895, has slender capillitium, with the lime-knots almost absent in some sporangia. Other specimens have a capillitium intermediate between these two extremes, and show a variation in this character, greater perhaps than in the different varieties of *P. nutans* Pers. The proof thus afforded of the specific identity between *P. nodulosum* and the Lyme Regis gathering first described in 1891 under the name of *P. calidris* (*l. c.* 52) shows that the former name should take precedence.

P. VIRESCENS var. β. OBSCURUM. A gathering of this marked variety was obtained under a clump of hollies in Epping Forest, near Loughton, on Nov. 3rd, 1896. It was on a holly-leaf, and is similar to the specimen figured *B. M. Cat. Myc.* Pl. XX. B, except that the sporangia are all subglobose and somewhat scattered, and that the capillitium is less profuse.

CHONDRIODERMA ROANENSE Rex. I have lately received two specimens of this species from the United States of America. One is from Dr. W. C. Sturgis, of New Haven, Conn., collected by him on "hemlock bark" at Shelburne, N.H., in Sept. 1896. The other is from Mr. F. L. Harvey, of Orono, Me., who found it in the neighbourhood of that town in the autumn of 1896. He states (*Bull. Torrey Bot. Club*, xx. No. 2, 67) that it was met with in some abundance by Mr. Merrill at E. Auburn, Me. These repeated gatherings confirm the integrity of the species. It is referred to B. M. Cat. Myc. 84, under the account of *C. radiatum* as needing further records to establish its specific distinction. The specimens correspond exactly with Dr. Rex's type, except that the sporangia are more globose, and the black stalks are longer.

DIDERMA CONCINNUM B. & C. Very little remains of the type-specimen from S. Carolina, No. 3021 (Kew Collection, 1476), named as above in Berkeley's handwriting, but there is sufficient to show it is a fairly typical form of *Chondrioderma radiatum* Rost. The apparently sessile sporangia are of the usual size and colour, with a sporangium-wall of typical character. The columella is hemispherical or subglobose on a broad base. The capillitium consists of violet-brown flexuose threads. The spores are violet-brown, minutely spinulose, 8–9·5 μ diam.; they have not attained their full depth of colour, and adhere when making a glycerine-jelly preparation in consequence of the growth not having been quite mature. Rostafinski gives *Diderma concinnum* as a synonym for *Chondrioderma floriforme*, from which it is distinguished by the spores. A specimen from Maine (Kew Collection, 375), marked *Chondrioderma concinnum*, and quoted in Massee's *Monograph*, p. 308, as "*Physarum concinnum*," is a pale form of *Badhamia lilacina* with characteristic capillitium and spores, and is referred to in *B. M. Cat. Myc.* 35. I had inadvertently taken this specimen as a type of *Diderma concinnum* B. & C., and had neglected until after the publication of my monograph to make a careful examination of the original type of the latter.

The name "*Physarum concinnum* B. & C." has been given by Mr. Morgan, of Ohio, to a species of which I have received a specimen. It is quite distinct from either of the two specimens in the Kew Collection referred to, and, judging from the small example in hand, I place it as possibly a form of *P. compressum* A. & S., but the granules of lime in the sporangium-wall and lime-knots are large for that species. I make this explanation to correct my own mistake, and also on account of the confusion that has arisen with regard to the name.

Diachæa subsessilis Peck. This beautiful species was found on dead bramble-leaves and stems in Flitwick Wood, Beds, on Sept. 8th, 1896. The sporangia are about 0·5 mm. diam., subglobose and with an iridescent lustre, either provided with a conical white stalk or sessile, or of plasmodiocarp form. The columella is shortly conical or obsolete. The capillitium consists of a network of violet-brown threads radiating from the columella. The spores have a greenish colour, occasioned by the yellow contents appearing through the pale purplish spore-wall, which is beset with minute spines arranged in a reticulate pattern, as described by Dr. Rex (*B. M. Cat. Myc.* 92). Some groups of sporangia are entirely destitute of lime, and in this case they are either sessile or have a short black stalk, the columella being reduced to a yellowish membranous tube. The limeless form agrees in all respects, including the sculpture of the spores, with a specimen of *Lamproderma Fuckelianum* Rost. var. *cracowense* Racib. kindly submitted for inspection by Dr. Celakovsky, of Prague. It has a striking bearing on the species named by Dr. Sturgis *Comatricha cæspitosa*, a form without lime, which I suggested might be a variety of *Diachæa Thomasii* (l. c. 92), though the constancy of the long, membranous columella in repeated gatherings makes it probable that it is a distinct species. There is a near relationship between *D. Thomasii* and *D. subsessilis*, and, judging from the few gatherings that have been obtained, the difference consists in the orange-coloured stalks and clustered grouping of the papillæ on the spores (under high magnification) of the former, as compared with the white stalks, densely charged with white lime-granules, and the reticulate arrangement of the papillæ on the spores of the latter. The peculiar greenish colour of the spores is confined, as far as my observation extends, to *D. subsessilis* Peck, *D. Thomasii* Rex, and *Comatricha cæspitosa* Sturgis.

A specimen of the Flitwick gathering has been submitted to Dr. Sturgis for comparison with the American type of *D. subsessilis* Peck. He considers it identical with the latter species, but has been unable to procure an example of the type, which appears to represent a single gathering, and is now placed in the New York Museum.

Didymium dubium Rost. has been abundant this winter in the locality where it was first found at Lyme Regis in April, 1888. I obtained it from near Lyndhurst, New Forest, in Oct. 1896, and at Witley, Surrey, in the same month. Through the courtesy of Dr. Celakovsky, jun., I possess part of the original type gathered by Opiz at Hauenstein in 1836. It confirms my opinion that our English gatherings belong to the same species; some of these exhibit similar capillitiums and spores, though we find a considerable range of variation; the capillitium is usually more rigid and the spores paler than in the type.

D. EFFUSUM var. TENUE, n. var. *Sporangia* sessile, annular, orbicular-depressed, or elongated plasmodiocarps with a central depression; grey, or glossy brown from the absence of lime. There is often a well-defined line of dehiscence round the upper margin of the sporangium-wall. The sporangium-wall is sparingly beset with minute lime-crystals, or naked. Columella none. Capillitium of slender, flexuose, violet-brown threads of equal thickness, but beaded with dark prominences here and there. Spores minutely spinulose, palish purple-brown, 7–8 μ diam.

This form has appeared in extreme abundance among dead sycamore and Spanish chestnut leaves in Wanstead Park, Essex, during last autumn. It is constant in its characters, and I first gathered it in the same locality in April, 1888; the crystals are always scanty, and the capillitium coloured. Considering the wide divergence, in the Wanstead Park gatherings, from the usual type of *Didymium effusum*, and the absence there of intermediate forms, they would appear to claim specific rank; but bearing in mind the great variety exhibited by *D. effusum* in sporangia derived from plasmodia of a common origin, and the near approach of some of the effused forms to the one under consideration, it appears better, for the present at least, to record it as a variety of that species. I propose the varietal name of *tenue* on account of the constant slender form of the plasmodiocarps.

COMATRICHA LURIDA Lister. This species has been abundant during last winter in the locality where it was first discovered at Lyme Regis in 1890, and where it has been gathered almost every year since that date. It has also been met with sparingly in other parts of the district. It was found in large quantities on dead leaves under hollies at Witley, Surrey, in Oct. 1896, and Mr. E. S. Salmon collected it on dead leaves at Reigate in Jan. 1897. The species is well-marked and constant in its characters, and though difficult to recognize at first from its similarity to sporangia of *Lamproderma irideum* which have lost their iridescent walls, and with which common species it is often accompanied, it is unmistakable as a mounted object. I know of no other record of its collection beyond those above mentioned.

C. RUBENS Lister. In addition to the stations mentioned (*B. M. Cat. Myc.* 123), this species has been found in Epping Forest, and also at Witley, Surrey, and was unusually common at Lyme Regis in the winter of 1896–7. Like the species last referred to, it is strikingly constant in all its characters, but, from its minute size and close similarity in colour to the dead leaves on which the sporangia are found, it is easily overlooked. The persistent basal portion of the sporangium-wall appears to be an invariable feature, and renders the position of the species in the genus *Comatricha*, rather than in the genus *Lamproderma*, a somewhat doubtful one.

C. TYPHOIDES var. γ. MICROSPORA Lister. A large gathering of this form was obtained on dead sycamore, oak, and bramble leaves, under brambles on the margin of the woods in Wanstead Park, Essex, in Nov. 1896. It is precisely the same form as that from

Lyme Regis referred to in *B. M. Cat. Myc.* 121, with faintly reticulated spores 4 μ diam. The latter specimen was found on larch-bark lying on a thick bed of larch-needles. In both of these gatherings the surface branches of the capillitium are elegantly looped throughout, without free ends. They differ in this respect from *C. typhoides* var. α, which always has free ends in the upper part of the sporangium, and usually over the whole surface. If it were not that, in addition to the faint reticulation on the spores, the warts can be detected to which Dr. Rex drew attention as characterizing the species *C. typhoides*, and also from the fact that intermediate American forms appear to unite all the varieties of *Comatricha* in which these curiously-warted spores are present, the var. *microscopica* would seem entitled to stand as a distinct species. A gathering of this variety from Berlin is represented in the British Museum by specimen 638, Sydow Myc. Marth 1866. It was issued under the name of *Stemonitis ferruginea*.

C. Persoonii var. fusca, n. var. Throughout last autumn *C. Persoonii* has been common in Epping Forest and Wanstead Park. It was mostly of the typical form with gregarious sporangia containing the usual pale lilac-brown spores. In Wanstead Park, however, a large growth came up on dead leaves under brambles, of more crowded erect sporangia, recognizable at a glance from the ordinary form as taller and more rigid in appearance. The capillitium is dense; the spores dark and similar to those of *C. laxa*, from some forms of which with dense capillitium it is not easily distinguished when individual sporangia are compared. Specimens in the British Museum from Broome's collection had caused me perplexity until I recognized them as being the same species as the Wanstead form of *C. Persoonii*, which retained its distinctive characters in continuous growths through Sept., Oct., and on to Nov. 5th. The habitat on dead leaves, and the somewhat rufous colour of the sporangia in the field, distinguish it from *C. laxa*, which is found on sticks and logs; and it so nearly resembles some forms of typical *C. Persoonii* that the only diagnostic feature is the dark spores. As, however, it is represented by several specimens in the Brit. Mus. Collection, and appears to be constant in its characters, it may be useful to mark it by the varietal name of *fusca*, in allusion to the colour of the spores.

Siphoptychium Casparyi Rost. I have received a fine and typical specimen of this species from Mr. Robert E. Fries, of Upsala, who gathered it last year in Wermland, Sweden. I know of no previous record of its occurrence in Europe.

Licea flexuosa Pers. was found in great abundance on chips about the stumps of felled Scotch firs near Witley, Surrey, in November, 1896, and February, 1897.

Trichia contorta var. lutescens. In the description of this variety in *B. M. Cat. Myc.* 169, founded on my gatherings in Norway in 1894, I stated that if further specimens should be obtained confirming the constancy of the characters, it should be made a distinct species. Dr. Nyman has sent me a specimen collected by Miss A. Cleve at Njammets, Lapponia Lulensis, Sweden, Sept. 9th, 1896. The sporangia are globose and sessile, agreeing in all respects with the above, except that the spores have a more olivaceous colour. As in the former gathering, the sporangium-wall consists of a yellow membrane, entirely free from granular deposits, and so delicate as to be embossed with the impression of the spores beneath. The elaters measure 4 μ in thickness, and have regular but faint spiral bands; the tips taper gradually, or end in a short point beyond a bulbous swelling. The spores are nearly smooth, 11 μ diam. There appears to be sufficient evidence to establish the integrity of the species, and I should give it the name of *Trichia lutescens*.

T. BOTRYTIS var. MUNDA, n. var. This variety is distinguished from var. α. by its usually smaller size, by the almost invariably mottled sporangium-wall, by the habitat being on dead leaves of oak, hornbeam, &c., rarely on wood; but especially by the smooth, neat elaters having about four bands which are perfectly regular and close in their spiral arrangement, and do not project above the intermediate spaces. The elaters are pale brown in colour, 3·5 μ in thickness, with moderately long tapering points. The character of the spiral bands is a constant one, as evidenced by gatherings by Prof. I. Bayley Balfour at Moffat about the year 1879; by Mr. J. Saunders at Pepperstock, Beds, in Oct. 1894; and by ourselves in the Black Forest near Freiburg, repeatedly in the neighbourhood of Lyme Regis, and abundantly in Epping Forest. Although a distinct variety, the spores are similar to those of var. α, and it resembles that form so nearly in other characters that it cannot be called a distinct species. The varietal name of *munda* is given on account of the neat elaters.

HEMITRICHIA INTORTA, var. LEIOTRICHA Lister, has been found in Wanstead Park and Epping Forest during last autumn. In one locality eighty-one sporangia were collected on dead leaves under brambles on a space little more than a foot wide. Considering the scattered habit of the species, this was a large gathering.

ARCYRIA FERRUGINEA Saut. This species is subject to much variation both in the colour of the sporangia and in the surface thickenings of the capillitium, but the large spores, about 9 μ diam., distinguish all forms of this and the doubtfully distinct Californian species *A. versicolor* from other members of the genus. The differences noticed in the capillitium-threads consist in the varied arrangement of spines, bands, and reticulations, and in the presence or absence of free ends. Several species have been created from time to time based on these characters. The specimen named *Heterotrichia Gabriellæ* Mass., from S. Carolina, in the Kew Collection, has been especially noted as distinct from *A. ferruginea* by the numerous free ends projecting from the network of the capillitium, but in some sporangia of that specimen I can find no free ends. *A. ferruginea* was unusually abundant last autumn in many localities. In my garden at Leytonstone a growth came up in November on a decaying trunk of Scotch fir, extending for several feet in length and some inches in breadth. The plasmodium was in part of the usual rosy red colour, but a large proportion was creamy white, shading into red. The sporangia that matured from the cream-coloured plasmodium ranged from yellow to orange and ferruginous, and those from the rosy plasmodium showed the same difference in tint. In some sporangia the capillitium had numerous free ends, similar in shape and reticulation to those in the type of *H. Gabriellæ;* in others none could be detected. The sculpture of the capillitium varied in sporangia taken from different parts of the growth in the presence or absence of spines and transverse bars, and in the character of the reticulation. Such diversity in sporangia, undoubtedly arising from a common origin, confirms the view that the presence or absence of free ends and the surface sculpture of the threads are unreliable characters on which to found specific distinctions. The capillitium of a gathering in Epping Forest in Nov. 1896 is terete in section, beset with spines and reticulations, but without transverse bars; it nearly approaches Rostafinski's type of *A. dictyonema* in character, yet the size of the spores and the pattern on the cup of the sporangium-wall leave no doubt that it is a form of *A. ferruginea.*

A. STIPATA Lister. At the time of the publication of the *B. M. Cat. Myc.* this species had only been recorded from America, with the exception of two specimens in the Kew Collection, one from Ceylon and the other from Nepal. Further examination of a specimen from "Merimasku, Finland, Karsten Fung. Fin. No. 378," named *Arcyria punicea* in the Kew Collection, proves it to be *A. stipata.* It was evidently mixed with other gatherings, as Karsten's specimen in the Brit. Mus. Collection, under the same name and number, is *A. punicea.* I have now received a fine example from Mr. E. S. Salmon, gathered at Margery Hall, near Reigate, on Dec. 11th, 1896, by Mr. W. F. Taylor. It is a larger form, with longer stalks than any I have seen from America, but the spiral lines on the capillitium are unusually distinct. It is interesting to be able to add this to the list of British species.

DIANEMA HARVEYI Rex. This species was gathered in Dec. 1895, on a decayed stem of *Clematis vitalba*, also in Jan. and March, 1897 on ash-sticks, in an ivy-covered dell near Lyme Regis, where it was discovered in Feb. 1894, and referred to in *B. M. Cat. Myc.* 204. Mr. Harvey states (*Bull. Torrey Bot. Club*, xxiii. No. 8, 307) that he has not met with the species since the original gathering was obtained on decorticated poplar near Orono, Me., in Sept. 1889, though searched for carefully.

LYCOGALA FLAVO-FUSCUM Rost. In Sept. 1895, Mr. C. Crouch, of Kitchen End, near Ampthill, Beds, observed a frothy white plasmodium at the base of a decaying elm, and watched it almost daily for a fortnight, when it had matured to a grey, pulvinate æthalium about an inch and a quarter in diameter. The cortex, capillitium, and spores are typical of *L. flavo-fuscum.* The colour of the plasmodium has not, I believe, been previously noted. On Oct. 4th, 1896, two æthalia about an inch and a half long, and depending

from a yellowish hypothallus, were gathered from the trunk of a dead beech in the New Forest, seven or eight feet from the ground; they are more brown in colour than the Ampthill specimen, but they had evidently been mature for a considerable time. The species appears to be rare.

DECADES PLANTARUM NOVARUM AUSTRO-AFRICANARUM.

AUCTORE R. SCHLECHTER.

(Continued from vol. xxxiv. p. 504.)

DECAS III.

21. **Muraltia exilis**, sp. n. Herba gracillima, erecta, glabra, e basi parum ramosa, 15–30 cm. alta; ramis erectis vel adscendentibus filiformibus, pro genere distanter foliatis; foliis erectis, lineari-filiformibus, acutissimis, glabris, vel microscopice margine ciliatis, dorso nervo medio incrassato subcarinatis, 1–1·7 cm. longis; floribus in axillis foliorum superiorum sessilibus, singulis, albidis; calycis foliolis erectis, æqualibus lanceolatis acutissimis, petala subexcedentibus, margine tenuiter ciliatis, 0·4 cm. longis; petalis erectis ad dimidium usque agglutinatis, oblique ligulatis obtusis, margine tenuiter ciliatis intus medio fere subbarbatis, vix 0·4 cm. longis; carina petala excedente, ungue lineari, lamina cucullata obtusissima intus glabra, basi obtusa (exauriculata), appendicibus petaloideis complicatis obcordatis, basi cuneatis, marginibus integris, 1·5 mm. longis; capsula subelliptica, more generis compressa, glaberrima, calyci longitudine æqua, cornubus apice subdeltoideis glabris, capsula 3–4-plo brevioribus; seminibus oblongis, pilis deflexis tenuiter hispidulis.

Habitat in regione austro-occidentali: In humidis juxta rivulum "Silvermine River" in planitie montis Steenberg prope Muizenberg, alt. c. 1500 ped., Jul. 1896. Leg. *Capt. Wolley Dod.*

From *M. filiformis* Thbg. our plant is distinguished by its much more slender habit, the sepals, much smaller flowers, and a very distinct fruit, quite unlike any other in the genus.

The colour of the flowers is pale pink, almost white, with a purplish carina.

22. **Coelidium humile**, sp. n. Fruticulus erectus, humilis, ramosissimus; ramis ramulisque sericeo-hirtis villosisve dense foliatis; foliis erectis lineari-lanceolatis vel lineari-oblongis, acuminatis, concavis, extus cano-sericeis, 0·3–0·4 cm. longis; floribus roseis ad apices ramulorum capitatis sessilibus; bracteis minutis, quam calyce duplo vel subduplo brevioribus oblongis ovatis, dense sericeis; calyce 0·4 cm. longo, sericeo; apicibus liberis subæqualibus, brevibus, suborbicularibus obtusis, intus puberulis; vexillo e basi graciliter unguiculato in laminam suborbicularem apice excisam, utrinque glabram, 0·6 cm. latam dilatato; alis vexillo vix brevioribus ungue gracili, lamina oblique oblonga

obtusa, utrinque glabra, 0·6 cm. longis; carina alis subæquilongis obtusa glabra; stylo subulato glabro, ovario ovoideo puberulo.

Habitat in regione austro-occidentali: In clivis lapidosis in summo monte "Matroosberg," alt. c. 6500 ped., Dec. 1895; *Dr. R. Marloth*, No. 2200.

This very interesting little novelty stands in the character of its flowers nearest to *C. muraltioides* Bth., but is easily distinguished by its much shorter habit, smaller flowers in few-flowered capitulum, and very different bracts.

Flowers purple, with a darker carina.

23. **Dolichos reticulata,** sp. n. Herba perennis, decumbens e basi ramosa; ramis plus minusve elongatis, filiformibus, teretibus, pilis reflexis bifariam villosis; stipulis oblongis obtusis, vel subobtusis, basi semisagittatis, marginibus ciliatis; foliis trifoliolatis, petiolatis, petiolo 1·7–2·5 cm. longo, gracili pilosulo, nunc subglabro, foliolis subæquimagnis, lateralibus oblique ovatis obtusiusculis vel acutiusculis, reticulato-nervosis, marginibus ciliatis exceptis utrinque glabris, foliolo intermedio paulo producto ovato-oblongo acutiusculo, 2–2·5 cm. longo, medio fere 0·8–1·3 cm. lato; pedunculis elongatis filiformibus, axillaribus, sparsim pilosis, folia excedentibus, plerumque unifloris, rarius bifloris; calycis 0·5 cm. longi segmentis subæqualibus ovato-lanceolatis subacutis, margine tenuissime ciliatis, tubo subæquilongis; vexillo breviter unguiculato, suborbiculari obtusissimo, c. 1 cm. longo, intus squamulis 2, falcato-oblongis obtusis basi donato, utrinque glabro; alis graciliter unguiculatis, lamina rhomboideo-obovata obtusissima, basi auriculata, 6 cm. longis, lamina infra apicem 0·5 cm. lata; carina cucullata obtusa alis fere æquilonga; ovario glabro, fusiformi; stylo subulato incurvo, dimidio superiore intus longitudinaliter barbato; siliqua gracili recta, apice subhamato incurva, c. 5 cm. longa, c. 0·3 cm. longa.

Habitat in regione austro-orientali: In saxosis montium Drakensbergen prope Polela (Nataliæ), alt. 6000–7000 ped., Febr. 1876. Leg. *M. S. Evans*, No. 630.

By its habit, the stipules, and the inflorescence well distinguished from the other South African species.

Mr. Evans describes the flowers as being "rose-coloured."

24. **Felicia bellidioides,** sp. n. Herba perennis acaulis; foliis ad apicem rhizomatis repentis rosulatis pluribus, oblanceolatis vel obovato-spatulatis obtusiusculis, in petiolum angustatis, pilis albidis sericeo-villosis, exsiccatione submembranaceis, 1·5–2·5 cm. longis, supra medium 0·5–0·8 cm. latis; scapo gracili erecto, simplici, nudo, pilosulo, 10–20 cm. alto; capitulo erecto, c. 1·3 cm. diametiente; involucri foliolis uniseriatis linearibus acutis puberulis c. 18, floribus radii brevioribus, 0·6–0·7 cm. longis; floribus radii 15–20 cæruleis, lineari-ligulatis obtusis; floribus disci tubulosis, antheris haud exsertis; acheniis compressis, obovoideis sparsim strigosis; pappi setis (in acheniis maturis flores disci subexcedentibus), strigoso-asperis, niveis.

Habitat in regione austro-occidentali: In cacumine montis

Matroosberg, in saxosis, alt. 7300 ped., Dec. 1895; *Dr. R. Marloth*, No. 2267.

The characters of the habit bring this plant nearer to *F. natalensis* Schltr. (*Aster natalensis* Harv.) and *F. lingulata* Klatt, both inhabitants of the south-eastern region. From the former it is well distinguished by the leaves and the flower-heads; the latter has filiform leaves and white flowers. In habit the plant resembles some species of *Bellis*.

The ray-flowers are blue; the disc yellow.

25. **Dimorphotheca spectabilis**, sp. n. Herba perennis simplex vel e basi parum ramosa, erecta, 30–45 cm. alta; caule stricto vel subflexuoso exsiccatione striato, foliato, apicem versus in pedunculum scabrido-puberulum denudato tenuissime scabrido, demum glabrescente; foliis erectis lanceolato-ellipticis vel lineari-lanceolatis acutis vel subacutis, integris, scabridiusculis, 3–5·5 cm. longis, medio fere 0·7–1 cm. latis; capitulo in genere inter majores; involucro 20–25-foliolato, foliolis lineari-lanceolatis acutis dorso scabrido-glandulosis, disco æquilongis, 1·2–1·4 cm. longis; floribus radii speciose purpureis ligulatis apice breviter 3-dentatis, 4-nervis, 4-lineatis, involucro duplo longioribus basin versus extus hispidis; floribus disci alte tubulosis, extus sparsim hispidulis, 0·7 cm. longis, lobis erectis ovato-deltoideis subacutis; antheris exsertis, filamentis glabris æquilongis; stylo subfiliformi in tubo antherarum omnino incluso; acheniis radii anguste 3-alatis, acheniis disci suborbicularibus, apice breviter truncatis, 1·3 cm. diametientibus, alis crassiusculis.

Habitat in regione austro-orientali: In collibus graminosis prope Barberton, alt. 4000–4500 ped., Sept., Oct. 1887; *E. E. Galpin*, No. 555.

The most beautiful species of the genus, with bright purple rays and brown disc. Distinguished from *D. Barberiæ* Harv. by the uniform rays and the achenes. *D. Barberiæ* has also smaller heads, and is a much weaker-growing plant.

26. **Phyllopodium glutinosum**, sp. n. Suffrutex spithamæus ramosus, glutinoso-puberulus; ramulis teretibus foliatis; foliis inferioribus oppositis, superioribus alternantibus e basi cuneato-angustata circuitu obovatis, acutis, margine parum grosse dentatis, 1–1·7 cm. longis, supra medium 0·4–0·7 cm. latis; spicis cylindricis dense multifloris, elongatis; bracteis foliaceis linearibus pedicello adnatis nunc integris nunc 1–2 dentatis, obtusiusculis calycem paulo excedentibus æquantibusve, utrinque glutinoso-velutinis; calyce subvelutino 0·3 cm. longo, alte 5-fido, segmentis subæqualibus lineari-subulatis; corolla calycem plus duplo excedente, glabra, tubo 0·6 cm. longo, e basi cylindrica fauce versus paulo dilatato, lobis patentibus rotundatis, superioribus inferioribus paulo majoribus; filamentis filiformibus glabris, antheris oblongis parvulis, brevioribus, corollæ tubum æquantibus, superioribus paulo excedentibus; stylo filiformi glabro, stamina longiora paulo superante; capsula ovoideo-oblonga obtusiuscula glabra, calycem post anthesin paulo ampliatam æquante.

Habitat in regione austro-occidentali: In saxosis in summo monte Matroosberg, alt. c. 6000 ped., Dec. 1892; *Dr. R. Marloth*, No. 2216.

Somewhat resembling *P. cuneifolium* Bth. from the south-eastern region, but well distinguished by the indumentum, the leaves, and larger flowers with a proportionately longer tube. I have not seen this rare plant in any other collection.

27. **Zaluzianskya crocea**, sp. n. Herba perennis, humilis, 5–8 cm. alta, basi parum ramosa; foliis patentibus vel erecto-patentibus, textura crassiore, inferioribus obovatis subacutis vel obtusis petiolatis, parum dentatis, nunc subintegris, usque ad 2 cm. longis, supra medium usque ad 0·7 cm. latis, superioribus sensim angustioribus sessilibus, plus minusve albido-pilosis, in bracteas decrescentibus; spicis cylindricis, vel ovoideis, densiusculis; floribus croceis subcorymbosis; bracteis foliaceis calycem vel fructum excedentibus; calyce alte bilabiato, villoso, labiis æquilongis, inferiore breviter exciso, superiore tridentato, 0·7 cm. longo; corollæ tubo tenuissimo subfiliformi-cylindrico, puberulo, faucibus vix ampliatis, c. 3 cm. longo, 0·1 cm. diametiente, segmentis divaricatis, alte emarginatis, croceis, lobulis rotundatis, faucibus pilosis; stylo filiformi, corollæ tubum paulo excedente; filamentis tenuissimis, glabris; ovario glabro; capsula oblonga, calyci æquilonga.

Habitat in regione austro-orientali: In monte Andriesberg, prope Queenstown, alt. 6350 ped., Mart. 1895; *E. E. Galpin*, No. 1927.

In general appearance this species somewhat resembles *Z. selaginea* Walp., but the pubescent corolla-tube, the leaves, and the fruits distinguish it well. The tube of the flowers and the lower surface of the lobes are whitish; the upper surface of the latter is bright orange, a colour not found before in the flowers of this interesting genus.

28. **Stachys simplex**, sp. n. Herba perennis, simplex erecta, 20–40 cm. alta; caule angulato stricta, dense villoso, dimidio inferiore densius medio laxe foliato; foliis ovato-oblongis vel lanceolato-oblongis obtusis vel subacutis, margine grosse dentatis, basi in petiolum brevem angustatis vel subsessilibus utrinque velutinis, 2–5 cm. longis, 1–1·5 cm. latis, superioribus sensim minoribus, floralibus abbreviatis, calyces vix excedentibus; spica sublaxa, cylindrica, elongata, usque ad 15 cm. longa, vix 2 cm. diametiente; verticillis 5–7-floris; floribus niveis breviter pedicellatis, illis *S. arvensis* L. subæquimagnis; calyce villoso, tubo segmentis vix longiore, segmentis deltoidis pungenti-mucronatis, corollæ tubo brevioribus; corolla extus villosa, calycem duplo excedente, tubo cylindrico, c. 0·6 cm. longo, c. 0·2 cm. diametro, labio superiore concavo obtuso, intus glabro labio inferiori duplo fere breviore, labio inferiore 0·6 cm. longo, trilobato, lobis lateralibus minutis, intermedio subquadrato, obtusato; filamentis filiformibus glabris, antheris minutis oblongis, longioribus 2 apicem labii superioris vix attingentibus; stylo filiformi glabro, labium superiorem excedente.

Habitat in regione austro-orientali: In graminosis montium "Saddleback-Mountains," prope Barberton (Transvaaliæ), alt. 4000–5000 ped., Novembr. 1890; *E. E. Galpin*, No. 1006.

Distinguished from *S. nigricans* Bth. by the indumentum, the leaves shorter, villous flowers, and shorter growth. The flowers are white.

29. **Thesium Galpinii**, sp. n. Frutex erectus (fide collectoris), 8-pedalis, laxus, ramosus, ramis gracilibus illis *T. angulosi* A. DC. tenuioribus, angulatis, subaphyllis; foliis depauperatis, squamæformibus valde dissitis, lanceolatis acutis glabris, erectis; floribus plerumque laxe spicatis, interdum subpaniculatis; bracteis linearibus acutis foliaceis, flore brevioribus, bracteolis 2 minutis ad apicem pedicelli brevis; perianthio alte 5-fido, segmentis lanceolatis extus glabris, intus margine subincurvo ciliatis, apice subuncinato-incurvo velutinis, intus medio fasciculo pilorum ad antheras tendente præditis, 0·5 cm. longis; staminibus ad basin loborum insertis, filamentis subulatis antheras longitudine æquantibus, antheris perigonio brevioribus; stylo subulato antherarum apicem vix attingente, stigmate simplici truncato; nuce ovoideo c. 0·5 cm. longa, lineis 10 longitudinaliter ornata, quarum 5 bene conspicuis, 5 basi nucis tantum visis, perigonio deflorato nuci vix æquilongo, stipite carnosiusculo corallino.

Habitat in regione austro-orientali: In cacumine montium prope Queenstown, alt. 4500 ped., Nov. 1893; *E. E. Galpin*, No. 1654.

A very distinct species, somewhat resembling *T. angulosum* A. DC., but with a different habit and a different style. The best mark of the species lies in the coral-red stipes of the ripe fruit, which I have never noticed before in any other South African species. Mr. Galpin writes that it is a shrub 8 ft. high; that is to say, it would be amongst the tallest of the genus.

30. **Watsonia gladioloides**, sp. n. Foliis radicalibus pluribus ensiformibus, more specierum nonnullarum Gladioli basi obliquis, nervosis, cartilagineo-marginatis, 40–50 cm. longis, medio fere 1·3–1·8 cm. latis; scapo stricto, valido, vaginis acutissimis, sensim in bracteas decrescentibus laxe vestito, folia excedente; spica subsecunda elongata, pro genere subdensa; spathis siccis erectis, exterioribus ovato-lanceolatis valde acutis, 3–3·5 cm. longis, interioribus apice breviter bifidis exterioribus paulo brevioribus; perianthio purpureo, c. 7 cm. longo, tubo arcuato e basi constricta dimidio superiore subcylindrico, c. 0·4 cm. diametiente, lobis erecto-patentibus, lanceolatis vel oblongo-lanceolatis acutis, c. 1·5 cm. longis, medio fere 0·4–0·5 cm. latis, lobo infimo deflexo vel patulo; staminibus perianthii tubum excedentibus, filamentis filiformibus glabris, antheris linearibus multo longioribus; stylo filiformi glabro; antheras excedente, brachiis c. 0·6 cm. longis, dimidio fere bifidis.

Habitat in regione austro-orientali: In clivis montis "Hanglip Mtn.," Jan. 1894; *E. E. Galpin*, No. 1784.

A remarkable plant, with the tube of *Antholyza nervosa* rather, but the style-branches and stamens of *Watsonia*, with which it agrees too in habit.

REMARKS ON PARATROPHIS HETEROPHYLLA Bl.

By T. Kirk, F.L.S.

New Zealand botanists have doubtless felt considerable uncertainty as to the specific identity of certain plants included rightly or wrongly under *Epicarpurus microphyllus* Raoul, the "turepo" of the Maoris, and the "milk tree" of the settlers. Certainly any ordinary observer examining Raoul's beautiful drawing and comparing it with the fine plate of *Trophis opaca* in the Banksian collection, would unhesitatingly conclude that two entirely different plants were represented by the artists, and for some time past I have been of the same opinion; but the examination of a large number of specimens from various localities has compelled me to believe that we have only a single species which exhibits an exceptional range of variation, so that it is necessary to point out the characteristics of the extreme forms.

Paratrophis heterophylla Bl. Mus. Bot. Lugd.-Bat. ii. 81. *Epicarpurus microphyllus* Raoul, Ann. Sc. Nat. ser. 3, ii. (1844), 117; Choix de Pl. de la Nouv. Zél. 14, t. 9; Hook. f. Handbk. N. Z. Fl. 251. *Taxotrophis microphylla* F. Muell. Fragm. Phyt. Austr. 6, 193.

North and South Islands:—Mongonui to Foveaux Strait; Great Barrier Island.

In the young state the typical form has slender, flexuous, often tortuous twigs with brown bark, pubescent or even setose at the tips, and very brittle; the leaves are distant, membranous, green, $\frac{1}{2}$–$\frac{3}{4}$ in. long, shortly petioled, varying from obovate to obovate-orbicular, cuneate at base, entire or deeply lobed below, or even pinnatifid, acute, sharply toothed; stipules ovate-subulate, caducous. In this state the plant forms a bush or shrub 3–8 in. high, which bears but a slight resemblance to the mature condition, and rarely produces flowers.

Gradually the leaves become coriaceous, the bark changes to a grey colour, sometimes almost white; the leaves become obtuse or even retuse, their margins crenate or crenate-dentate, while the lobation is less prominent and often disappears; the obovate outline may be retained, or pass gradually into obovate-elliptic or elliptic-ovate; the length may vary from $\frac{1}{2}$ in. or less to $1\frac{1}{2}$ in. In this state the plant may range from a shrub or bush to a small tree 40 ft. high or more, with a trunk not exceeding 24 in. in diameter, and pale grey or whitish bark. Flowers are produced freely, the male forming axillary or rarely terminal amenta, $\frac{3}{4}$–1 in. long, the flowers mixed with curious peltate scales having scarious white margins. Perianth deeply 4-partite, lobes rounded, ciliate; stamens 4, exserted. Female flowers in short erect 3–6-flowered spikes; flowers distant; perianth deeply 4-partite, the outer segments smaller than the inner; stigma bifid, both arms filiform, and stigmatiferous for their entire length; ovary 1-celled, 1-ovuled. Fruit as large as a peppercorn, 1-seeded, red, spherical, tipped with the short straight style. The slender rachis becomes pendulous as the fruit ripens; and it is remarkable that the fruits are almost invariably solitary, although the spikes are 3–6-flowered.

Var. *elliptica* = *Trophis opaca* Banks & Sol. MSS. et Ic.; Hook. f. Fl. N. Z. i. 224.

North Island:—Mongonui to Cook Strait; Taranga Islands; Stephen Island. Chiefly in places near the sea.

The Banksian plate exhibits the male and female spikes, mostly arranged in threes, springing from a terminal peduncle. I have no specimen exhibiting this peculiarity.

Var. *elliptica* is erect from a very early state, and does not appear to pass through the remarkable stages of development described above; it may be, however, that more extended observation might render it necessary to modify this statement, but I have seen no indication of such change. The twigs are straight, erect, with brown bark; the leaves are erect and rather close-set from the first, oblong or elliptic-oblong, acute, subacute or obtuse, margins crenate or crenate-dentate, coriaceous, 1–3½ in. long, ⅓–1 in. broad, slightly narrowed at both ends, but not obovate. Both male amenta and female spikes are often geminate, although usually solitary, and are larger than those of the type, sometimes 1½ in. long or more. The drupes, however, are numerous, the size of small peas, and being produced in great profusion resemble at a short distance racemes of red currants, the resemblance being increased by the slender rachis being invariably pendulous. It seems not unlikely that the greater number of perfect fruits on a spike in this variety may be due to the spikes being usually developed on the naked portions of the branchlets, and thus being more readily fertilized than when hidden amongst the leaves, and it is not impossible that the more robust habit of this plant may be indirectly connected with the same characteristic.

Notwithstanding the very different aspect presented by the extreme forms, a gentle gradation may be traced from the small membranous lobulate or pinnatifid leaves of the early stage of the type to the large elliptical entire leaves of var. *elliptica*, but it is not easy to find intermediate stages amongst the drupes.

Female flowers appear continuously through the season, especially in var. *elliptica*, in which they are developed to the end of February. In this form the unfertilized stigmas often remain on the rachis until the drupes are nearly ripe. The wood is white, compact and rather hard, but perishable.

I have to express my indebtedness to the Bishop of Waiapu, to Frank V. J. Williams, Esq., of Waipara, to A. Williams, Esq., of Taparoa, and other friends, for a copious supply of specimens from various localities; also to the authorities of the British Museum for a precious fragment of the original specimen in the Banksian collection.

The absence of any form of this plant from the Chatham Islands and Stewart Island is remarkable.

HOUSTOUN'S CENTRAL AMERICAN LEGUMINOSÆ.

By James Britten, F.L.S., and E. G. Baker, F.L.S.

Among the large number of species established in Miller's *Gardeners' Dictionary* (ed. 8, 1768), a considerable proportion are based upon specimens sent by Dr. William Houstoun from Vera Cruz, Campeachy, and Jamaica, or upon plants raised in Chelsea Garden from seeds forwarded by him. Many of these have been referred, often incorrectly, to other species subsequently described; others have never been identified.

The British Museum Herbarium, the historical value of which is becoming more and more recognized, affords material for clearing up the obscurity which surrounds these plants; for it contains (1) Miller's own herbarium, in which were a large number of Houstoun's specimens, many of them having MS. names attached in Houstoun's hand; (2) a large number of plants from Chelsea Garden sent by Miller to Sloane; (3) many of Houstoun's specimens in Herb. Banks; Houstoun's MSS. (five books) and drawings, from which the *Reliquiæ Houstounianæ* was selected: the MSS. contain many full descriptions of species, and, as well as the specimens, were annotated by Dryander. It would thus be no difficult task to identify a large number of Miller's descriptions, especially as some one (probably Dryander) has marked off in the *Gardeners' Dictionary* the species received from Miller.

As was pointed out in this Journal many years back,* it is matter for regret that Mr. Hemsley did not include the plants in the British Museum Herbarium in the Botany of the *Biologia Centrali-Americana.* By so doing he would not only have largely added to the completeness of his enumeration, but he would have cleared up a number of doubtful plants, and so have secured the solution of a number of puzzles which at present remain unsolved in the *Index Kewensis.* Nor does it appear that he extracted all the Mexican plants from the *Gardeners' Dictionary;* so that his handsome book, although a summary—we can hardly say a *handy* summary—of what was known at the time of its publication of the Central American flora, might have been rendered more complete bibliographically as well as botanically.

Our attention having lately been called to two or three of Houstoun's *Leguminosæ*, it seemed to us that it might be useful to examine the remainder of the order, with a view to ascertaining what proportion of specimens upon which Miller founded his species existed in the Herbarium, and how far they were capable of identification. The outcome of our investigation seem worth putting on record, as it has resulted in the determination of plants which have until now remained obscure; and the clearing up of obscurities is hardly less important than the description of novelties.

We give first give a tabular enumeration of the plants under Miller's names, with identifications: this is followed by notes upon the more interesting plants. A list of some Central American *Leguminosæ* from Houstoun which are not mentioned by Miller and a note of the plates in Miller's *Figures of Plants* based upon Houstoun's material are appended, followed by a description of an apparently undescribed *Bauhinia* based on a Houstoun plant, and a note on a Jamaica species which may as well appear here.

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* *Journ. Bot.* 1880, p. 90.

In the following list the sequence of the names as given in the *Dictionary* is followed; this is succeeded by an identification and an indication of the locality as given in Herb. Banks, with a reference to the volume and page of Herb. Sloane, when the species is also present therein.

	Hb. Banks.	*Hb. Sloane.*
Bauhinia tomentosa. See Note.	Campeachy	292. 30
Bauhinia ungulata. See Note.	Campeachy fide Mill.	
Bauhinia emarginata = B. aculeata L.?	Carthagena	
Bauhinia purpurea = B. glabra Jacq.	Vera Cruz	
Bauhinia rotundata = B. aculeata L.?	Carthagena	
Cassia frutescens = C. Sophera var. ligustrinoides Bth.	Jamaica	
Cassia villosa. Retained.	Campeachy	
Cassia uniflora = C. sericea Swartz.	Campeachy	293, ii. 40
Cassia fruticosa = C. bacillaris L.	Vera Cruz	
Cassia emarginata = C. pilosa L.	Jamaica	
Cassia biflora = Æschynomene brasiliana DC.	Jamaica	
Cassia arborescens = C. emarginata L.	Vera Cruz	292, 65
Cassia flexuosa = C. serpens L.	Jamaica	
Cassia chamæcrista. See Note.	Vera Cruz	
Cassia pentagonia. Retained.	Campeachy	
Cassia procumbens = C. hispidula Vahl.	Vera Cruz	292, 9
Colutea americana = Diphysa carthaginensis Jacq.	Vera Cruz	
Coronilla scandens = Chætocalyx pubescens DC. ?	Carthagena	
Crotalaria pilosa. See Note.	No locality given	
Crotalaria sagittalis = C. pterocaula Desv.?	No locality	
Crotalaria fruticosa. See Note.	Jamaica	
Crotalaria angulata. See Note.	Campeachy fide Mill.	
Erythrina americana = E. carnea Ait. See Note.	Vera Cruz	146, 12*a*
Galega frutescens = Indigofera mucronata Spr.	Vera Cruz	
Guilandina glabra. Retained (fide Grisebach).		
Hedysarum diphyllum = Zornia diphylla.	Vera Cruz	
Hedysarum purpureum = Meibomia tortuosa O. K.	Vera Cruz	292, 21
Hedysarum canescens = Meibomia incana Vail.	Jamaica	
Hedysarum sericeum = Meibomia cajanifolia O. K.	Vera Cruz	292, 27, 28
Hedysarum villosum = Meibomia barbata O. K.		
Hedysarum procumbens = Meibomia spiralis O. K.	Jamaica	
Hedysarum intortum = Desmodium trigonum DC.	Jamaica	292, 6
Hedysarum glabrum = Meibomia glabra O. K.	Campeachy	
Hedysarum scandens = Galactia pendula Pers.	See Note	
Hedysarum repens = Meibomia adscendens O. K.?	Havannah ex Mill.	
Hedysarum echastaphyllum = Ecastaphyllum Brownei	No specimen	
Lathyrus americana = Rhynchosia menispermoidea DC.	Vera Cruz	146, 41
Mimosa plena = Neptunia plena Benth.	Vera Cruz	
Mimosa pudica = Mimosa pudica L.	Vera Cruz	
Mimosa quadrivalvis = Schrankia aculeata Willd.	Vera Cruz ex Mill.	
Mimosa sensitiva = M. albida H.B.K.	Vera Cruz	292, 61
Mimosa asperata. Retained.	Vera Cruz	292, 17, 25
Mimosa cornigera = Acacia spadicigera Ch. & Schl.	Vera Cruz (Campeachy ex Mill.)	
Mimosa Houstoniana = Calliandra Houstoni Benth.	Vera Cruz	323, 51
Mimosa lutea = Acacia macracantha H. & B.	Jamaica	292, 1, 2
Mimosa glauca = Leucaena glauca Benth.	Vera Cruz	293, ii. 35; 292, 2

	Hb. Banks.	*Hb. Sloane.*
Mimosa angustissima = Acacia filicina Willd.	Vera Cruz	293, ii. 43; 146, 15 *b*
Mimosa campeachiana = Acacia sphærocephala Ch. & Schl.	Vera Cruz	292, 37
Mimosa cinerea = Piptadenia flava Benth.	Carthagena	
Ononis decumbens = Crotalaria pumila Ort.?	Vera Cruz	
Orobus americanus = Tephrosia cinerea Pers.	Jamaica	
Orobus argenteus = Tephrosia. See Note.	Vera Cruz	292, 63
Orobus procumbens = Tephrosia cinerea Pers. aff.	Vera Cruz	
Orobus coccineus = Indigofera leptosepala var. brevipes S. Wats.	Vera Cruz	146, 42
Poinciana pulcherrima.	Jamaica	
Psoralea hirta.	No specimen	
Psoralea scandens = Dalea enneaphylla Wilfd.	No locality	
Psoralea capitata.	No specimen	
Psoralea annua = Dalea alopecuroides Nutt.	Not localized, Vera Cruz ex Mill.	292, 21
Psoralea humilus = Dalea enneaphylla Willd.	Vera Cruz	292, 62
Robinia rosea = Lonchocarpus roseus DC.	Campeachy	292, 64
Robinia glabra = Dalbergia campeachiana Benth.	Campeachy	
Robinia pyramidata = Cæsalpinia sp.	Campeachy	316, 73
Robinia violacea = Peltophorum Linnæi Benth.	Jamaica & Vera Cruz	292, 65
Robinia latifolia = Lonchocarpus violaceus.	Campeachy	324, 45
Spartium arborescens = Brya Ebenus DC.	Jamaica	

CROTALARIA PILOSA. This plant was grown in Chelsea Garden from seeds sent from Vera Cruz by Houstoun. It is figured by Martyn (*Hist. Pl. Rar.* t. 43), the plant from which the drawing was made being grown in Chelsea Garden from seeds sent by Robert Millar from Porto Bello. With this corresponds a specimen from Herb. Cliffort., labelled *C. sagittalis*, which species was founded on the description in *Hortus Cliffortianus*, p. 356: the specimen is var. β. of Hort. Cliff. The synonyms cited from Hermann, Tournefort, and Plukenet do not belong here, nor does Gronovius's plant cited by Linnæus in *Sp. Pl.* i. 714. Marcgrave's early figure of *Sagittaria cordialis* cited in *Hort. Cliff.* probably, however, comes here.

CROTALARIA SAGITTALIS. Miller says that this plant was sent him from South Carolina by Dale, and from Jamaica by Houstoun. Neither of his two specimens—one in flower, the other in fruit—is localized. Both are imperfect, but suggest *C. pterocaula* Desv.

Considerable confusion has arisen as to *C. sagittalis* L., the complete solution of which requires a fuller investigation than we have been able to bestow upon it. It may be noted, however, that the species was founded in *Hort. Cliff.* 356 (1737), and, as has already been said, the description there and the specimen in Herb. Cliffort. seem to correspond with the plant subsequently known as *C. pterocaula* Desv. Linnæus in *Hort. Cliff.* distinguishes three forms: α. is based on Pluk. *Alm.* t. 277, fig. 2, the plant afterwards, in De Candolle's *Prodromus*, distinguished as *C. Purshii*: there are three specimens from Plukenet in Herb. Sloane, all of which agree with the figure and description. β. is the plant of the Cliffort Herbarium, and is, as has been said, identical with *C. pilosa* Mill. γ. ("foliis lanigeris ovatis") we do not know.

In the *Species Plantarum*, 714 (1753), *C. sagittalis* is established on the plant of *Hort. Cliff.*, to which is added the plant of Gronovius, *Fl. Virg.* This latter, the *C. sagittalis* of American authors, is a very different plant from *C. pterocaula*. The matter is further complicated by the specimens in the Linnean Herbarium, where *C. sagittalis* is represented by two sheets, one of which is the plant just referred to (*C. sagittalis* Auct. Amer.), while the other is *C. stipularia* Desv.

This is one of the cases in which some botanists, with a view to simplifying a difficult problem, would abandon altogether the Linnean name under which apparently three species were placed by Linnæus. We do not ourselves feel justified in taking such a course.

Crotalaria fruticosa. There are two sheets in the Herbarium named *C. fruticosa*, one a wild specimen gathered by Houstoun in Jamaica, the other probably a cultivated specimen from Chelsea Garden, where Miller grew the plant; both were referred by Solander to *C. sagittalis*. The wild specimen agrees with some of Rugel's Florida gatherings labelled *C. Purshii*, and is evidently very close to, if not identical with, that species. Plukenet's specimens in Herb. Sloane, upon which the figure (on which *C. Purshii* is established) in his *Phytographia* (277, fig. 2) is based, have broader leaves, but the species appears to be variable in this respect. A plant closely corresponding with this Houstoun specimen is one of the representatives of *C. sagittalis* in the Linnean Herbarium. Miller's specimen of *C. fruticosa* (with which another sheet from Chelsea Garden agrees) approaches very closely to *C. pterocaula* Desv.; and *C. fruticosa* Mill. is retained by Macfadyen (*Flor. Jam.* 240) for a plant which Grisebach (*Fl. Brit. West Indies*, 178) subsequently referred to *C. pterocaula* Desv.

Crotalaria angulata. This is said in the *Dictionary* to come from Campeachy; it does not differ from *C. biflora* L. It seems possible that some mistake in locality has occurred.

Ononis decumbens. This is named *O.? Milleri* by Seringe in DC. *Prod.* ii. 168, as the name *decumbens* had been previously applied by Thunberg to a Cape species of *Ononis*. Seringe adds "an potius *Indigoferæ* species"; the plant is, however, certainly a *Crotalaria*—probably *C. pumila* Ort., so far as can be judged from the imperfect specimen.

Orobus coccineus. In the *Index Kewensis* this is identified with a plant figured under the same name name in Lodd. *Bot. Cab.* t. 883, and the two are referred to *Lathyrus sphæricus;* Miller's plant, however, bears no relation to that figured by Loddiges.

Orobus argenteus. There are three sheets so named in Herb. Banks from Vera Cruz, all of them belonging to *Tephrosia*. The one to which Houstoun's synonym is affixed is a barren fragment, and offers no material for determination. Another sheet is *Tephrosia nitens* Benth.; the third sheet is probably *T. toxicaria*, to which *T. Schiedeana* Schl. in *Linnæa*, xii. 299, judging from description, seems to be closely allied. Houstoun's imperfect drawing may refer to either of these, as may also his MS. description.

Colutea americana (Vera Cruz, Houstoun, 1730) = *Diphysa carthaginensis* Jacq. *Pl. Amer.* 208, t. 181, fig. 51, as interpreted by

Bentham in *Kjoeb. Vidensk. Meddel.* 1853, 13. Bentham had not seen Jacquin's type, nor have we; there is, however, a fragmentary specimen in Herb. Banks from him (from Carthagena), in which the leaflets are narrower than in Seemann's Panama specimen (no. 202), which Bentham identifies with the species, and with which Houstoun's plant agrees. In Jacquin's figure of the fruit the costæ are more marked than in Houstoun's specimens. The plant in Herb. Sloane 292, 22, agrees with Miller's specimen, but a second sheet in Herb. Banks from Houstoun may perhaps belong to a different species, but the material is insufficient. Houstoun in his MSS. gives a full-description of the fruit, which it may be worth while to transcribe :—

"Arbor est foliis, floribus, magnitudine, et toto habitu, *Coluteæ vulgari* similis, singulari vero siliquarum formâ multum ab ea discrepans. Hujus etenim siliquæ pollices binos cum dimidio sunt longæ, octo circiter lineas latæ, vix ultra duas crassæ; et ita compresssæ ut diameter major ea sit quæ valvarum media jungit, minor quæ earundem margines. Intus autem non unica est cavitas, sed margines valvularum connectuntur septo transverso, duplici constante membranâ in qua latent semina plura oblonga, reniformia. Utrinque vero est cavitas, dicto septo et tumente valvâ formata, soloq. ære repleta."

Plukenet's "Colutea Veræ Crucis vesicaria" (*Alm.* 111, t. 165, fig. 3), referred here by Miller, is not this plant.

CORONILLA SCANDENS. This plant is probably *Chætocalyx pubescens* DC. (*Prod.* ii. 310), but DeCandolle's description is insufficient to determine this. *C. pubescens* is not given by Grisebach in his *Flora of Brit. W. Indies*; the plant was originally described from St. Domingo, and has not, so far as we know, been taken up by authors. Bentham named as *C. pubescens* a specimen in Herb. Kew from Fendler, Venezuela, No. 291, and there is placed with it another specimen from Galipan (*Moritz*, No. 14), with which the Miller plant agrees very well. There are, however, on Fendler's plant small scattered prickles similar to those of *C. vincentinus*, which we do not find on Houstoun's specimen. Miller's plant in Herb. Mus. Brit., which was placed by Bentham in *Chætocalyx*, but without specific name, does not seem to correspond with any other described species; should it prove distinct, it might well take Miller's name as *Chætocalyx scandens.* Miller gives an excellent diagnosis and description in English of the plant, which he grew in Chelsea Gardens from seeds sent him by Houstoun from Carthagena, and which he considered identical with *Coronilla scandens pentaphylla*, of Plumier. On this latter Linnæus based his *Coronilla scandens*, also a plant of uncertain affinity; but Plumier's figure (*Pl. Amer. ed. Burm.* t. cvii. fig. 3) does not correspond with Miller's plant, though it may be one of the Brazilian species of the genus.

HEDYSARUM PURPUREUM = *Desmodium tortuosum* DC. (*Meibomia tortuosa* O.K.). Miller's ticket is missing, and Houstoun's specimen from Vera Cruz is not, as usual, written up with Miller's name; but the synonymy and description leave no doubt as to the identity of the plant.

HEDYSARUM SERICEUM. This is a *Desmodium* closely allied to *D. cajanifolium* DC., of which it is probably a form. It agrees in the inflorescence and shape of the legumes, but differs in the leaf, the leaflets being ovate or elliptic-ovate, instead of oblong.

HEDYSARUM VILLOSUM was transferred to *Desmodium* by De Candolle (*Prod.* ii. 338) as "*D.? villosum.*" Houstoun's specimen from Vera Cruz, 1731, to which his MS. name cited by Miller is attached, is *Meibomia barbata* O.K., to which *M. villosa* O.K. must therefore be referred as a synonym. Judging by description, *M. neglecta* O.K. (*Nicolsonia villosa* Cham. & Schlecht., *D. villosum* of Hemsley, erroneously quoted by Kunze as of Cham. & Schlecht.) must also be placed here. Dr. Kunze bases his *M. cayennense* O.K. upon *Nicolsonia cayennensis* DC., of which he cites as a synonym *D. barbatum* Bth. & Oerst.: he does not seem to have noticed that this is also identical with his *M. barbata*. Every day makes it more evident that the wholesale transference of species from one genus to another without a careful examination of either plants or bibliography can only result in an unnecessary multiplication of synonyms.

HEDYSARUM PROCUMBENS is the type of *H. spirale* Swartz, *Prod.* 107 (1788), and consequently of *Desmodium spirale* DC. *Prod.* ii. 332. It was collected by Houstoun in Jamaica in 1730.

The Tropical African plants referred to *D. spirale* DC. want further investigation.*

Swartz in his *Prodromus* takes up several of Miller's Hedysarums, but changes the names; for instance:—

H. canescens Mill. = *H. incanum* Swartz, *l. c.* 107.

HEDYSARUM GLABRUM = *Desmodium? glabrum* DC. *Prod.* ii. 338 (1825) (*Meibomia glabra* O. K.). The following supplements De Candolle's description:—Stem herbaceous, erect. Leaves trifoliolate; the leaflets are described as obcordate in the original description, but in the type specimen they are ovate-acute. Inflorescence paniculate, finely pubescent; pedicels slender, $\frac{1}{5}$–$\frac{1}{4}$ in. long. Pod twisted, terminal segment lunulate, monospermous, this segment being 3½–4 lines long, rather less broad. Sutures on both sides convex, but ventral suture slightly intruded at point of insertion of seed. Houstoun's name for this plant was "Hedysarum triphyllum, annuum, erectum, siliquis intortis et ad extremum amplioribus." It was gathered at Campeachy in 1730.

Our material is hardly sufficient to form a very definite opinion, but the plant is certainly closely allied to *D. molle* DC., and differs apparently chiefly in the tomentum on the under side of the leaflets.

HEDYSARUM REPENS Mill., non Linn. Appears to be *Meibomia adscendens* O.K. Miller's specimen is very young, without either flowers or fruit; it is not localized, but, according to the *Dictionary*, was grown in Chelsea Garden from seeds sent from Havannah by Houstoun.*

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* *Desmodium tortuosum* DC. is founded on *Hedysarum tortuosum* Swartz, *l. c.*, which is itself founded on a plant and figure in Sloane's *History of Jamaica*, 1, t. 116, fig. 9—"Hedysarum triphyllum fruticosum flore purpureo, siliqua varie distorta."—Sloane. The plant is in Herb. Sloane. 3, 86. Houstoun collected the plant in Vera Cruz in 1730; specimens from him are in Herb. Banks and in Herb. Sloane, 292, p. 21, and 146, p. 15 *h*.

Erythrina americana. On this plant Dryander based his *E. carnea* Ait. (*Hort. Kew.* ed. 1, iii. 8). We have specimens from Houstoun (Vera Cruz, 1731) and from Hort. Kew. (1779) written up by Dryander. Miller's name, however, must stand, as it antedates Dryander's by twenty-one years. The plant is not recorded for Central America by Mr. Hemsley. There is a good figure in Trew, *Pl. Select.* ii. t. 8, but the pod on Houstoun's specimen in Herb. Sloane (146, p. 12*a*) has a short acute beak, very different from the long attenuated termination as figured by Trew. Miller raised the plant in Chelsea Garden from seeds sent from Vera Cruz.

Hedysarum scandens. There can be little doubt from Miller's description that this is *Galactia pendula* Pers. This, however, is a West Indian plant, and Miller says that Houstoun's plant was sent to him from Vera Cruz. There is in Herb. Banks a specimen from Jamaica (Houstoun) to which he has attached Sloane's name, "Phaseolus minor lactescens flore purpureo." *Clitoria Galactia* L. (*Galactia pendula* Pers.) was established on Sloane's Jamaica plant, and with this Houstoun's specimen entirely agrees. It seems therefore likely that Miller wrote "la Vera Cruz" instead of "Jamaica."

Lathyrus americanus Mill. This is doubtfully referred by S. Watson (*Index*, 205), who is followed by Jackson, to *Baptisia perfoliata* Br. Houstoun's specimens in Herb. Banks and in Herb. Sloane (146, 41), with his drawing, leave no doubt as to the identity of the plant with *Rhynchosia menispermoidea* DC., under which it was placed long since by Mr. Bennett.

Robinia rosea (= *Lonchocarpus? roseus* DC.) is near *L. sericeus* (*fide* Bentham in *Journ. Linn. Soc.* iv. Suppl. 101), but in our judgment is not that species; the material is only scanty. It comes from Campeachy. There is another specimen in Herb. Sloane (292, 64), but this is also incomplete.

Cassia uniflora. Swartz says (*Prodr.* 66 (1788)) that his *Cassia sericea* is founded on "*C. sericea* Mill. Dict."—the *Index Kewensis* gives it as first published in *Fl. Ind. Occ.* 724 (1798), where is also cited *C. sericea* Mill. Dict., but Miller has no such name. Swartz meant *C. uniflora* Mill. Dict., of which he quotes the description, and Bentham (*Trans. Linn. Soc.* xxvii. 536) cites Miller's type under *C. sericea*. Miller's name *uniflora* is the earliest, and must stand for this species, although, as Bentham (*l.c.*) points out, his specimen is not single-flowered. There is a specimen from Chelsea Garden in Herb. Sloane, 293, pt. 2, p. 40.

Cassia villosa is kept up by Bentham. In *Ic. Pl.* t. 1060, Bentham says Miller's and Pavon's specimens probably came from Oaxaca, but the former is from Campeachy and the latter from Peru. This plant is not in Millspaugh's *Enumeration of Yucatan Plants*, but there is a specimen in the Herbarium from Schott, Merida, No. 1.

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* It may be mentioned here that *Hedysarum pedunculatum* Mill. (*Desmodium pedunculatum* DC. *Prod.* ii. 338) = *Psoralea melilotoides* Michx.

CASSIA CHAMÆCRISTA. There are two sheets from Herb. Miller so labelled, neither of which is *C. Chamæcrista* L. One of these from Vera Cruz, Houstoun (bearing Houstoun's name in his MS., as cited by Miller), is *C. procumbens* L., and is the plant referred to that species by Bentham (*l. c.* 578) as of "Mill. Dict. no. 17." The other sheet, which appears to be that quoted by Bentham as "*C. Chamæcrista* Mill. Herb. at non Dict.," and referred by him to *C. virgata* Sw., is in our judgment *C. flavicoma* H.B.K., to which species it was allocated by Trimen when he was rearranging our Cassias in accordance with Bentham's revision. With *C. flavicoma* is also placed a sheet from Herb. Miller labelled *Cassia flexuosa*, but Houstoun's plant (the *C. flexuosa* of Mill. Dict.) is, as has been said, *C. serpens* L. Besides these specimens, we have from Herb. Mill. a small specimen of another *Cassia* of the *Chamæcrista* section, to which is attached in Miller's hand a descriptive phrase of Houstoun's which we do not find in his MS. The specimen, which is from Vera Cruz, is very imperfect; it corresponds exactly with another specimen from Miller preserved in Herb. Sloane, 293, 43, but the combined material is not sufficient for specific determination.

BAUHINIA EMARGINATA. In the absence of flowers it is not possible to determine this species positively, but it is closely allied to *B. aculeata* L., if not identical with it.

BAUHINIA ROTUNDATA Mill. Dict. Doubtfully referred by De Candolle to *B. aculeata* L., but seems distinct. Miller's specimens have neither flower nor fruit. The specimen representing *B. aculeata* in Cliffort's Herbarium closely resembles this, and is equally imperfect. *B. aculeata* is based on the description and plate in *Hortus Cliffortianus;* neither flowers nor fruit are described or figured, and the plate corresponds sufficiently with Cliffort's specimen; but, as is well known, the plants in Cliffort's herbarium do not always correspond with the descriptions in *Hortus Cliffortianus.*

BAUHINIA TOMENTOSA Mill., non Linn. Belongs to the section *Schnella*, but we have not matched it with any of the described species.

BAUHINIA UNGULATA L.; Mill. Dict. No. 4. Of this species little seems to be known, even as to locality, beyond the description in *Hort. Cliff.*, where it is localized "in America." The description there given and the specimen from Cliffort's garden agree perfectly with a plant from Campeachy placed with *B. ungulata* by Miller, who cites Houstoun's descriptive phrase. This is identical with *Pauletia inermis* Cav. *Ic.* v. 6, t. 409 (*B. inermis* Pers. *Syn.* i. 455) from Acapulco, which must therefore be reduced to a synonym. Barclay's specimens from Fonseca, referred to *B. inermis* by Bentham, *Bot. Sulph.*, and Hemsley, *Bot. Biol. Centr. Amer.* i. 338, agree perfectly with the Linnean plant. Miller grew the plant in Chelsea Garden from seeds sent from Campeachy.

MIMOSA CINEREA Mill., non Linn. So far as Houstoun's plant is concerned, this is *Piptadenia flava* Benth. Miller has placed Houstoun's name upon a plant from Carthagena which entirely agrees with this species.

There are only two of Miller's species of which we are unable to find specimens. These are *Psoralea hirta* and *P. capitata*. These have not, so far as we are aware, been taken up by any subsequent writer, probably because the same specific names were employed by Linnæus. But the Linnean plants are South African, and *P. capitata* was published subsequently to Miller's plant, which is not (most likely for the reason above suggested) taken up in the *Index Kewensis*. In all probability Miller's plants are species of *Dalea*, but in the absence of specimens it is impossible to say with certainty.

The following Central American *Leguminosæ*, not included in Miller's *Dictionary*, are in the Herbarium from Houstoun :—

Æschynomene americana L. Vera Cruz.
Cæsalpinia bijuga Swartz. Campeachy.
Calliandra eriophylla Benth. Vera Cruz.
Calliandra gracilis Klotzsch. Carthagena.
Calliandra tergemina Benth. Vera Cruz; also in Herb. Sloane, 292, 32. Linnæus founded this species (as *Mimosa tergemina*) partly on Houstoun's MSS., in which there is a full description of the plant—there is also a sketch among his drawings.
Calopogonium cæruleum Desv. Vera Cruz.
Cassia patellaria DC. Vera Cruz.
Cassia Tagera L. Vera Cruz.
Meibomia barbata O. K. Vera Cruz.
Meibomia tortuosa O. K. Vera Cruz.
Hedysarum triflorum L. Vera Cruz.
Lonchocarpus rugosus Benth. Campeachy.
Rhynchosia phaseoloides DC. Vera Cruz; also in Herb. Sloane, 292, 42.

The following plates of *Leguminosæ* in Miller's *Figures of Plants* (1760) are based upon specimens grown in Chelsea Garden, seeds of which were forwarded by Houstoun :—

pl. 4. *Leucaena glauca* Benth.
pl. 5. *Calliandra Houstoni* Benth.
pl. 6. *Acacia sphærocephala* Ch. & Schl.
pl. 82. *Cassia pentagonia* Mill.
pl. 182, fig. 1. *Schrankia aculeata* Willd.
    fig. 2. *Neptunia plena* Benth.
    fig. 3. *Mimosa asperata* L.
pl. 291. *Piptadenia flava* Benth.

Other plants from Houstoun are figured on plates 44 and 57.

Bauhinia (CASPARIA) **unilaterale**, sp. n. Frutex vel arbor ramulis glabris vel glabriusculis. Folia ad $\frac{1}{3}$–$\frac{1}{2}$ biloba lobis subacutis, basi rotundata vel subcordata, 2–3$\frac{3}{4}$ poll. longa, circiter 7-nervia, rigide membranacea utrinque glabra subtus pallidiora. Petiolus $\frac{3}{4}$–1 poll. longus ad extremitates incrassatus. Flores in racemos densos et unilaterales dispositi, racemis axillaribus. Bracteolæ acutæ. Pedunculi 1$\frac{1}{2}$–2 poll. longi. Pedicelli primum 1–3 lin. longi, demum paullo longiores. Alabastra columnaria puberula. Calycis tubus striatus 3–4 lin. longus. Stylus fili-

formis. Ovarium stipitatum pluriovulatum. Legumen planum circiter 6 poll. longum an ultra, $\frac{2}{3}$ poll. latum, demum glabrum bivalve, 12–16 sperma.

Hab. Vera Cruz, *Houstoun*, Herb. Sloane, 292, 8. Fortin, *E. Kerber*, Plantæ Mexicanæ, No. 286. Nom. vernac. Pata de cabra. In flower and fruit Feb. 1883.

A shrub or small tree? Branchlets nearly glabrous, occasionally a few scattered glands, not aculeate. Leaves glabrous, lobed about $\frac{2}{5}$–$\frac{1}{2}$ of their length, generally 7-nerved, longer than broad; petioles slender, terete, base rounded or subcordate, apex of lobes hardly divaricate. Flowers are in a dense or rather dense unilateral raceme. Fertile stamen much longer than rest. Peduncle about 1$\frac{1}{2}$–2 in. long. Bracteoles short, acute. Buds columnar, pubescent. Calyx spathaceous, tube cylindrical, striate. Ovary and legume stipitate. Ovary covered with a white tomentum, which disappears in a later stage. The unilateral raceme is a striking feature of this plant—the leaves recall those of *Bauhinia ungulata*. It is quite distinct from the two species of the same section described by Dr. Donnell Smith from Guatemala, *B. Rubeleruziana* and *B. Pansamalana* (*Bot. Gazette*, xiii. 27).

B. unilaterale appears to be perfectly distinct from *B. spathacea* Moc. & Sess. *Fl. Mex. Ic. Ined.* t. 224, which is likewise of the § *Casparia*. The inflorescence of this latter plant as shown in the tracing is racemose, but not unilateral, and the leaves are comparatively little lobed—apparently never as far as the middle. The pod of *B. spathacea* is shown as 4-seeded.

B. leptopetala Moc. & Sess. *l. c.* t. 223, another somewhat obscure Mexican *Bauhinia*, appears from the tracing to have five fertile stamens, and leaves divaricately lobed about $\frac{1}{4}$ or $\frac{1}{3}$ their length—the lobes being acute.

TERAMNUS UNCINATUS Swartz. We have a specimen from Herb. Miller with a ticket in Houstoun's hand (probably from Jamaica) which Swartz has written up as his *T. volubilis*. Swartz, however founds that species in his *Prodromus* on Sloane's plant (*Hist.* i. 182)—with which he places *Dolichos uncinatus* L.—and the plant on which P. Browne (*Hist. Jam.* 290) founded his genus *Teramnus*. Linnæus (*Sp. Pl.* ed. ii. 1019) based *Dolichos uncinatus* on Plumier's figure (t. ccxxi.), which does not resemble very closely either species of *Teramnus*. Some confusion has been introduced by Swartz's allocation of the name *uncinatus* to a second species. Houstoun rightly points out that his plant differs from Sloane's in that "the hair upon the pod is not white, but brown," and this is one of the characters on which Grisebach (*Fl. Brit. West Ind.* 193) relies as distinguishing *T. uncinatus* from *T. volubilis*. We have in Herb. Mus. Brit. specimens of both, sent to Banks from Jamaica by Swartz, and these agree with his brief diagnoses in *Prodr. Ind. Occ.* 105. It seems clear therefore that, in spite of Swartz's identification, Houstoun's plant is *T. uncinatus*.

WELWITSCH'S AFRICAN FRESHWATER ALGÆ.

By W. West, F.L.S., and G. S. West, A.R.C.S.

(Plates 365–369.)

(Continued from p. 183.)

14. Arthrodesmus Ehrenb. (1836).

1. A. hiatus W. B. Turn. in *K. Sv. Vet.-Akad. Handl.* Bd. 25, no. 5, 134, t. xi. f. 34 & 40 & t. xii. f. 1 (1893). Long. 25–26 μ; lat. sine acul. 28–29 μ, cum. acul. 31–32·5 μ; lat. isthm. 9 μ; crass. 11 μ.

Huilla. Lopollo; Febr. 1860. No. 192.

The specimens have the minute spines almost patent and not converging; the apices are not so flattened as in Turner's figures.

15. Gymnozyga Ehrenb. (1840).

1. G. moniliformis Ehrenb. in *Bericht. Verh. Preuss. Akad. Wissenschaft. Berlin*, 212 (1840). *Desmidium Borreri* Ralfs in *Ann. Nat. Hist.* xi. 375, t. 8, f. 4 (1843). *Didymoprium Borreri* Ralfs, *l. c.* xvi. 10 (1845); *Brit. Desm.* 58–9, t. iii. (1840). *Bambusina Brebissonii* Kütz. *Phyc. Germ.* 140 (1845). Long. cell. 28–30 μ; lat. cell. 16–18 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

XII.—Vaucheriaceæ.

1. Vaucheria DC. (1803).

1. V. sessilis (Vauch.) DC. *Flor. Fr.* ii. 63 (1805); Cooke, *Brit. Freshw. Alg.* 123, t. 46, f. 1–20 & t. 48, f. 1–5. *Ectosperma sessilis* Vauch. *Hist. Conferv.* 31, t. ii. f. 7 (1803). Crass. fil. veget. 69–75 μ; lat. oospor. 79 μ, altit. 90 μ.

Golungo Alto. In fossis exsiccatis adhuc humidis in Varzea pone dom. Isidni; Aug. and Sept. 1855. No. 132. Covers in Aug. and Sept. all the half-dried-up ditches of the plain.

Var. monogyna var. n. Var. oogoniis semper solitariis, ovatis et leviter obliquis vel ovato-rostratis. Crass. fil. veget. 46–77 μ; lat. oospor. 67–103 μ; crass. membr. oospor. 4·8–5·8 μ.

Golungo Alto. Ad margines stagnorum rivi Cuango; Aug. 1857, No. 155.

XIII.—Hydrogastraceæ.

1. Botrydium Wallr. (1815).

1. B. granulatum (L.) Grev. *Alg. Brit.* 196, t. xix. (1830); Cooke, *Brit. Freshw. Alg.* 114, t. 45. *Ulva granulata* L. *Sp. Pl.* 1633. *Hydrogastrum granulatum* Desv.

Var. æquinoctiale, var. n. Var. minor, circiter tertia pars dimensionis plantæ typicæ; plantis densissime aggregatis.

Loanda. Non infrequens in territor. Loandensis terris humidis argillaceo-arenosis, latis plagas imo urbis ipsius plateas etc. obtegens; mox post pluvias copiosas nascens, citoque tempore sicco disparens. Ad fin. Apr. 1854. No. 199.

Very little could be made out from the specimens which were on dried mud, but a rough sketch made by Welwitsch accompanying them was sufficiently characteristic of the genus.

XIV.—Palmellaceæ.

1. Cœlastrum Näg. (1849).

1. C. robustum Hantzsch in Rabenh. *Alg. Europ.* no. 1407; Reinsch in *Abhandl. Naturhist. Gesellsch. Nürnberg*, Bd. 3, H. 2, 88 (1866); Schmidle in *Berichte der Naturfors. Gesellsch.* Freib. 79, t. ii. f. 11 (1893). *C. indicum* W. B. Turn. in *K. Sv. Vet.-Akad. Handl.* Bd. 25, no. 5, 161, t. xx. f. 11 (1893). C. cœnobiis globosis, e cellulis 8, 16 vel 32 constitutis, cellulis globosis et subdepressis e mutua pressione, confertis; membrana cellularum crassissima; areolis minutis et subtriangularibus. Dimens. plant. afric.:—Diam. cœnob. 67 μ; diam. cell. 15–16 μ; crass. membr. cell. 2 μ.

Libongo. Ad margines flum. Lifune: Sept. 1858. No. 204.

Var. confertum var. n. Var. cœnobiis minoribus, e cellulis 64 constitutis, cellulis hexagono-sphæricis, duplo-minor quam in forma typica, areolis minutissimis et indistinctis. Diam. cœnob. 37 μ; diam. cell. 7–8 μ.

Libongo. Cum form. typ. No. 204.

2. Sorastrum Kütz. (1845).

1. S. spinulosum Näg. *Gatt. einz. Alg.* 99, t. v. D (1849). Diam. cœnob. cum spin. circ. 51 μ; lat. cell. 17 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

3. Pediastrum Meyen (1829).

1. P. Tetras (Ehrenb.) Ralfs in *Ann. Nat. Hist.* xiv. 469, t. 12, f. 4 (1844). *Micrasterias Tetras* Ehrenb. (1838). Cœnob. 4, 1 + 7, 5 + 11; diam. 12·5–35 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

4. Ophiocytium Näg. (1849).

1. O. majus Näg. *Gatt. einz. Alg.* 89, t. iv. A, fig. 2 (1849). Diam. 12·5 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

2. O. parvulum (Perty) A. Br. *Alg. Unicell.* 55 (1855). *Brochidium parvulum* Perty. Diam. 3·5–4 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

5. Scenedesmus Meyen (1829).

1. S. denticulatus Lagerh. in *Ofv. Kongl. Vet.-Akad. Förhandl.* 1882, no. 2, 61, t. ii. f. 13–16.

Var. LINEARIS Hansg. in *Archiv. Naturwiss. Landesdurchf. Böhm.* Bd. 6, no. 6, 268 (1888). Long. cell. 10·5–17 μ; lat. cell. 3–5·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

6. TETRAEDRON Kütz. (1845).

1. T. MINIMUM (A. Br.) Hansg. in *Hedwigia*, 1888, 131. *Polyedrium minimum* A. Br. in Rabenh. *Fl. Europ. Alg.* iii. 62. Diam. 9·5–11·5 μ; crass. 5·5 μ.

From the references given under the name *T. minimum* in his paper in *Hedwigia* it would appear that Hansgirg was under the erroneous impression that Braun described this plant in Rabh. *Fl. Europ. Alg.* as a *Tetraëdron*.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

2. **T. tropicum**, sp. n. T. mediocre, trigonum, lateribus levissime concavis, angulis rotundatis, membrana crassa et scrobiculata, scrobiculis magnis et hexagonis, propter scrobiculos magnos confertos margo asperus videtur; a latere visum subrhomboideo-ellipticum. Diam. 27–30 μ; crass. 16 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

This should be compared with *T. reticulatum* (Reinsch) Hansg.; in the latter species the membrane is not nearly so thick, and the scrobiculations are so large that the superficial part of the membrane only consists of a fine reticulation.

3. T. TETRAGONUM (Näg.) Hansg. *l. c.* (1888). *Polyedrium tetragonum* Näg. *Gatt. einz. Alg.* 84, t. iv. B, fig. 2 (1849).

Var. INERME (Wille in *Bihang t. K. Sv. Vet.-Akad. Handl.* Bd. 8, no. 18 (1884), 12, t. i. f. 25). Diam. 21 μ; crass. 9·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

4. T. PUSILLUM (Wallich). *Micrasterias pusilla* Wallich in *Ann. Mag. Nat. Hist.* ser. iii. vol. v. 281, t. xiii. fig. 13 (1860). *Staurophanum pusillum* W. B. Turn. in *K. Sv. Vet.-Akad. Handl.* Bd. 25, no. 5, 159, t. xx. f. 22 (1893).

Var. ANGOLENSE, var. n. Var. cellulis subtortis vel irregulariter tetrahedricis, angulis profundius divisis, divisionibus 2 (vel 3) late divaricatis, spiniformibus sed tubularibus pæne ad apicem. Diam. sine spin. 19–23 μ, cum spin. 27–36 μ; crass. 8·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

We see no reason for Turner's genus *Staurophanum*, as no clear line of demarcation can be drawn between those species which it would include and those referable to *Tetraëdron*. Indeed *Tetraëdron pusillum* is very closely connected through its var. *angolense* with *T. lobulatum* (Näg.) Hansg.

5. T. REGULARE Kütz. *Phyc. Germ.* 129 (1845). *Polyedrium tetraëdricum* Näg. *Gatt. einz. Alg.* 84, t. iv. B, fig. 3 (1849). Diam. 27 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

Forma MAJUS Reinsch in *Abhandl. Naturhist. Gesellsch. Nürnberg*, Bd. 3, H. 2, 77, t. v. fig. 2 (1866). Diam. 49 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

7. BOTRYOCOCCUS Kütz. (1849).

1. **B. Micromorus**, sp. n. B. familiis libere natantibus, e aggregationibus subdistantibus 4–multis cellularum formatis, aggregationibus muco indistincto et filis connexis; cellulis perparvis globosis vel angulari-globosis confertis 8 (interdum plus minusve) in aggregatione unaquaque. Diam. fam. 40–60 μ; diam. cell. 3–4·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

8. OOCYSTIS Näg. (1855).

1. O. NOVÆ SEMLIÆ Wille in *Öfv. Kongl. Vet.-Akad. Förhandl.* 1879, no. 5, 26, t. xii. f. 3. Long. cell. 16 μ; lat. cell. 9·5–10 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

Var. MAXIMUM West in *Journ. R. M. S.* 13, t. ii. f. 25 (1894). Long. cell. 33 μ: lat. 23 μ. This is yet a larger form than the British one.

Golungo Alto. Ad margines stagnorum rivi Cuango; Aug. 1857. No. 155.

2. O. SOLITARIA Wittr. in Wittr. & Nordst. *Alg. Aq. Dulc. Exsicc.* Fasc. v. No. 244; *Bot. Not.* 1879, 24. Long. cell. 22–27 μ; lat. 11·5–14·5 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

Forma MAJOR Wille in *Öfv. Kongl. Vet.-Akad. Förhandl.* 1879, no. 5, 26. Long. cell. 40 μ; lat. 22 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

9. **Athroocystis**, gen. n.

Plantæ aquaticæ, familias parvas formantes, in strato denso pulverulento aggregatas; familiis e cellulis numerosissimis compositis, intra tegumentum tenuissimum firmum non mucosum dense confertis. Propagatio ignota.

1. **A. ellipsoidea**, sp. unica. A. familiis ellipsoideis, ovoideis vel breviter oblongis; cellulis subinæqualibus, rotundo-polygonis (e mutua pressione); contentum cellularum pallide viride et homogeneum. Long. fam. 48–69 μ, lat. 38–48 μ; diam. cell. 3–7·5 μ.

Mossâmedes. In stagnis lemnigeris cum Typha et Junco prope Aguada; July 1859. No. 131.

This alga, by reason of its small families of densely-crowded cells and the nature of its integument, differs considerably from any other genus of *Palmellaceæ*.

10. GLŒOCYSTIS Näg. (1849).

1. G. GIGAS (Kutz.) Lagerh. in *Öfv. Kongl. Vet.-Akad. Förhandl.* 1883, no. 2, 63. *Protococcus gigas* Kütz. *Phyc. Germ.* 145 (1845); *Verwandl. der Infus.* fig. vi. 1 (1844). *Chlorococcum gigas* (Kütz.) Grun. Diam. cell. 11·5–15 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

2. G. RUPESTRIS (Lyngb.) Rabenh. *Kryptog. Flor. Sachs.* 128 (1863). *Palmella rupestris* Lyngb. *Tentamen Hydrophyt. Dan.* 207, t. 69, fig. D (1819). Diam. fam. 13–33 μ; diam. cell. 3·5–4·5 μ.

Pungo Andongo. Alga terrestris, ad ligna putrescentia in rupibus convallibus; Nov. 1856. No. 110.

3. G. VESICULOSA Näg. *Gatt. einz. Alg.* 66, t. iv. F (1849). Long. cell. 9–10 μ; lat. cell. 4–4·5 μ.

Libongo. Ad margines flum. Lifune; Sept. 1858. No. 204.

11. UROCOCCUS Kütz. (1849).

1. U. INSIGNIS (Hass.) Kütz. *Spec. Alg.* 207 (1849). *Hæmatococcus insignis* Hass. *Brit. Freshw. Alg.* 324, t. lxxx. f. 6 (1845). *Chroococcus macrococcus* Rabenh. Diam. cell. 40 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

After enunciating the characters of his "First Subgenus" of *Hæmatococcus* Ag., Hassall (*Brit. Freshw. Alg.* i. 322) says that "the term *Ouracoccus* might be applied to the species of this subgenus." Improving on this suggestion, Kützing, according to the reference on p. 206 of his *Species Algarum*, establishes the genus *Urococcus* of Hassall; but it cannot be held to constitute publication of a new genus, and, if *Urococcus* is to stand, it must be as *Urococcus* Kütz. *Spec. Alg.* 206 (1849).

12. STICHOCOCCUS Näg. (1849); em. Gay (1891).

1. S. FLACCIDUS (Kütz.) Gay, *Recherches quelq. Alg. Vertes*, 79, t. xi. f. 101–106 (1891). *Ulothrix flaccida* Kütz. *Spec. Algar.* 349 (1849). Crass. fil. 5·5–7·5 μ.

Loanda. Inter *Protococcum botryoidem* (Kütz.) Kirchn.; Oct. 1858. No. 128.

13. PROTOCOCCUS Ag. (1824).

1. P. VIRIDIS Ag. *Syst. Algar.* 13 (1824); Kütz. *Tab. Phyc.* i. (1845–9), p. 3, t. 3. Diam. cell, 4–8·5 μ.

Loanda. Ad parietes domorum &c. sæpius humectatas in ipsa urbe Loanda, ast sparsim. Locus habitationis hujus algæ austrum versus spectat; July 1854. No. 126.

2. P. BOTRYOIDES (Kütz.) Kirchn. in Cohn, *Kryptog. Flora Schlec.* Bd. 2, Erste Hälfte, 103 (1879). *Microhaloa botryoides* Kütz. *Phys. General.* 169 (1843); *Tab. Phyc.* i. (1845–9), 6, t. 7. Diam. cell. 4–5 μ.

Loanda. A light green cover, often remaining dry, on the inner part of wooden water reservoirs; Oct. 1858. No. 128.

MYXOPHYCEÆ.

XV.—RIVULARIACEÆ.

1. CALOTHRIX Ag. (1824).

1. C. FUSCA (Kütz.) Born. & Flah. in *Ann. Sci. Nat.* 7e série, Bot. iii. 364 (1886). *Mastichothrix fusca* Kütz. in *Phyc. General.* 232 (1843). Crass. fil. ad bas. 8·5–13 μ; crass. trich. 3·5–9 μ.

Pungo Andongo. In *Batrachospermo gracillimo* ad lapides submersas in rivulo de Tangue; May 1857. No. 3.

2. **C. breviarticulata**, sp. n. Filis solitariis vel gregariis, algas majores aquaticas affixis, longitudine toto usque 380 μ, a base ad apicem gradatim attenuatis; vagina crassa lamellosa, plantis vetustis brunneo-nigrescentibus; trichomatibus pallide æruginеis, articulis brevissimis discoideis, diametro 4–5-plo brevioribus; heterocystis solitariis, basilaribus et hemisphæricis. Crass. fil. ad bas. 15–16 μ, ad med. 11·5–12·5 μ; crass. trich. ad bas. 8·5 μ, ad med. 5·5–7·5 μ.

Pungo Andongo. Epiphytica in *Mougeotia angolensi* ad ramulos Podostemacearum in rivulis (Casalalé); March 1857. No. 105.

The habit, together with the gradual attenuation of the filaments, brings this nearest to *C. adscendens* (Näg.) Born. et Flah. (*l.c.* 365), but its smaller size, its shorter filaments, and its very short cells easily distinguish it. The younger plants, which have only attained a length of about 100 μ and a thickness of 5·5–7·5 μ, have their cells only 2–3 times shorter than the diameter. It also comes near to *C. endophytica* Lemmermann in *Forschungsberichte Biolog. Station zu Plön*, iv. 184 (1896), but has a different sheath and very short filaments; the heterocysts are also very distinct.

3. **C. epiphytica,** sp. n. Filis minutis et epiphyticis algas majores aquaticas affixis, solitariis vel subgregariis, longitudine toto usque 250 μ (raro 350 μ), de base ad apicem gradatim attenuatis; vagina subcrassa, hyalina et achroa; trichomatibus æruginеis apice in pilum tenuissimum productis, articulis diametro subæquilongis, paullo brevioribus basin versus et longioribus apicem versus; heterocystis basilaribus solitariis et parvis. Crass. fil. ad bas. 5–7·5 μ; crass. trich. ad bas. 3·5–4 μ.

Mossâmedes. Epiphytica in *Œdogonio* sp., freq. in stagnis puris ad ripas flum. Bero; Aug. 1859. No. 190.

2. Dichothrix Zanardini (1858).

1. D. olivacea (Hooker) Born. & Flah. *l.c.* 375 (1886). *Calothrix olivacea* Hooker (1845). Crass. trich. ad bas. 9·5–14·5 μ.

Pungo Andongo. Inter *Scytonema Myochrous* var. *chorographicum*, in summis rupibus; Febr. 1857. No. 6. Etiam inter *Scytonema Millei* ad rupes vulc. humectans prope Cacella; Febr. 1857. No. 7.

2. D. gypsophila (Kütz.) Born. & Flah. *l.c.* 377–8 (1886). *Schizosiphon gypsophilus* Kütz. *Phyc. Gener.* 234, t. 6, fig. 2 (1843). This seems to have been luxuriantly developed, and reached 5 mm. in height; the filaments were not incrusted with lime, as is often the case with this species. Diam. trich. 7–8 μ.

Pungo Andongo. Inter *Scytonema Myochrous* var. *chorographicum*, in rupib. perpendic. ad latera boreal. et occid. de Pedra Songue; April 1857. No. 12. Inter *Scytonema cincinnatum* var. *æthiopicum*, in pascuis spongiosis breve graminosis juxta rupes gig. prope Catete; May 1857. No. 111.

3. Glœotrichia J. Ag. (1842).

1. **G. æthiopica,** sp. n. Thallo plus minusve expanso, irregulari, usque 3 cm. lato, olivaceo-viridi; filis laxe associatis, pressione facile secedentibus; trichomatibus pallide olivaceo-viridibus, in

pilum crassum attenuatis, articulis ad basin depressis vel subglobosis, superioribus diametro duplo longioribus; sporis cylindricis, polis rotundatis, diametro 4-plo longioribus, episporium strato singulo formatum, flavo-brunneum et glabrum. Crass. trich. ad bas. 7–9·5 μ; diam. heterocyst. 9·5 μ; long. spor. 46–50 μ; lat. spor. 12·5–13·5 μ.

Mossâmedes. Satis freq. inter Charæ speciem in rivo Caroca prope Cabo negro; Sept. 1859. Nos. 19 and 173.

This species differs from *G. natans* (Hedwig) Rabenh. *Deutschl. Kryptog.-Flora*, 90 (1847), in the length of its cells and in its spores.

XVI.—Sirosiphoniaceæ.

1. Hapalosiphon Näg. (1849).

In this genus the *spores* are produced from the ordinary vegetative cells of certain of the plants. They are formed from the majority of (or even all) the cells of both the primary filaments and branches of some portions of these plants, and have always thick yellowish-brown cell-walls. The outward form of the spores varies with the different species, the dimensions being about those of the vegetative cells. (Cfr. also Hansgirg in *Oesterreich. Bot. Zeitschr.* xxxiv. 393 (1884); West in *Journ. Linn. Soc.* xxx. 272, pl. xv. f. 23–28.) In most of the species the branches arise at right angles to the main filament, and the cell of the main filament directly under the branch projects slightly into the sheath of the latter.

1. **H. luteolus**, sp. n. H. inter alias algas aquaticas in cæspitibus minutis luteo-brunneis et dense intricatis repertus; filis primariis flexuosis, e serie singula cellularum formatis, vaginis firmis, amplis et lutescentibus, cellulis æruginosis, oblongo-rectangularibus, sæpe subquadratis et diametro usque 3-plo longioribus, protoplasmate granulato; ramis solitariis, subremotis, elongatis et flexuosis (rarius brevibus et subrectis), filo primario diametro æqualibus, apicibus non attenuatis; vaginis cellulisque iis filorum primariorum similibus; heterocystis intercalaribus, oblongo-rectangularibus (diametro 1½–3-plo longioribus); sporis subquadratis vel diametro paullo longioribus. Crass. fil. 9·5–11·5 μ; crass. cell. 5·5–6 μ.

Huilla. Inter alias algas, in uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15. In graminosis paludosis juxta rivulum Lopollo; April 1860. No. 180. Etiam Morro de Lopollo; May 1860. No. 182.

This species occurs in minute tufts, and the great resemblance to each other of the primary filaments and branches, together with their thick yellowish sheaths, characterize it.

2. **H. aureus**, sp. n. H. inter alias algas aquaticas in cæspitibus aureo-brunneis dense intricatis repertus; filis primariis tortuoso-intricatis, e serie singula cellularum formatis, vaginis firmis, tenacibus, crassis, aureo-brunneis, hyalinis et in plantis vetustis punctulatis, cellulis multe variabilibus, subquadratis vel subglobosis, diametro brevioribus et subellipsoideis, oblongis et diametro usque 7–8-plo longioribus; ramis unilateralibus frequentibus,

singulis vel geminatis, longis et flexuosis, filo primario diametro tenuioribus, interdum ramosis, vaginis crassis et plerumque achrois, cellulis variabilibus, iis filorum primariorum similibus, sæpe indistinctis; protoplasmate pallide æruginoso et minute granulato; heterocystis intercalaribus, rectangulari-oblongis (diametro $1\frac{1}{4}$–$3\frac{1}{2}$-plo longioribus); sporis non visis. Crass. fil. prim. 11·5–12·5 μ; diam. cell. 7·5–8 μ; crass. ram. 6·5–9·5 μ, diam. cell. 4–6·5 μ; diam. heterocyst. 6 μ.

Huilla. Inter *Schizotrichem fuscescentem*, in paludibus exsiccandis; April 1860. No. 176. Etiam inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

This has a very distinct facies from *H. luteolus*, being of a bright golden brown colour, with more tortuose filaments, the sheaths of which have a very different appearance; the cells also are much more variable (and usually longer), the branches are more numerous and of a different thickness to the primary filaments, and often arise in pairs.

3. H. INTRICATUS West in *Journ. Linn. Soc.* xxx. 271–2, pl. xv. f. 16–28 (1894). An aquatic form; spores rectangular oblong, $1\frac{1}{2}$–3 times longer than broad. Crass. fil. 5·5–7 μ.

Huilla. In cæspitibus parvis intricatis inter *H. luteolum*, in uliginosis editioribus, prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

4. **H. Welwitschii**, sp. n. H. inter alias algas aquaticas sparsus, flavo-æruginosus; filis primariis subflexuosis, vaginis arctissimis, indistinctis et hyalinis, e serie singula cellularum formatis, cellulis inæqualibus, diametro æqualibus vel paullo longioribus (raro duplo longioribus), subglobosis, subquadratis vel oblongis; ramis frequentibus plerumque unilateralibus, brevibus, patentibus, filo primario diametro æqualibus vel paullo tenuioribus, subattenuatis, vaginis achrois, arctis sed distinctis, cellulis variabilibus, diametro $\frac{1}{2}$–3-plo longioribus; heterocystis rarissimis, intercalaribus, rotundo-quadratis vel rectangulari-oblongis; sporis subglobosis vel oblongis, polis rotundatis (diametro 1–2-plo longioribus). Crass. fil. prim. 5·5–7·5 μ; crass. ram. 3·5–5·5 μ; heterocyst. 6–8 μ × 6 μ; spores 5–8·5 μ × 5 μ.

Pungo Andongo. Inter *Batrachospermo gracillimo* in rivulo de Tangue; May 1857. No. 3.

This species may be compared with *H. hibernicus* West & G. S. West (*in Journ. R. M. S.* 1896, 163), from which it differs in the longer cells of the primary filaments; in having much fewer branches, which are also shorter and not flexuose; moreover, the cells of the branches, as well as the heterocysts, never attain the length of those of *H. hibernicus*. Compare also with *H. intricatus* West.

2. STIGONEMA Ag. (1824).

The cells of this genus are protoplasmically continuous throughout the whole plant, a fine strand of protoplasm, passing from cell to cell along the middle of the filament, effecting this continuity. This is best seen in plants that have been dried and soaked out, the

cells then appearing like beads on a string. These connecting threads are not visible in living plants, but in becoming dry the protoplasm shrinks away from the minute canal along which it passes through the septa, and on soaking again does not reattain its natural position.

1. S. OCELLATUM (Dillw.) Thur. in *Ann. Sc. Nat.* 6e ser. Bot. i. 380 (1875). *Conferva ocellata* Dillw. *Brit. Conferv.* 60–1, Supp. pl. D (1809). *Sirosiphon ocellatus* Kütz. *Spec. Algar.* 317 (1849); *Tab. Phyc.* ii. (1850–2), 11, t. 37, f. ii.

A small form; crass. fil. 27–38·5 μ; in small quantity amongst *Zygnema* sp., growing on tufts of *Scytonema Myochrous* var. *chorographicum*, on rocks on the northern and western sides of Pedra Songue; April 1857. No. 153.

Forma MAJOR. A large and finely-developed aquatic form; crass. fil. 45–61 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179. In paludibus exsiccandis; April 1860. No. 176.

2. **S. flexuosa**, sp. n. Filis aquaticis, inter algas varias repertis, elongatis, flexuosis et sparsim ramosis; ramis solitariis, exacte patentibus et filo primario diametro æqualibus, apicibus rotundatis et non attenuatis; vaginis amplis, achrois (raro flavescentibus), hyalinis, vix lamellosis; cellulis in serie singula, rotundato-quadratis, æruginosis, inter se subdistantibus (sæpe $\frac{1}{2}$–$\frac{3}{4}$ diametri cellulæ seorsum); heterocystis raris, lateralibus. Crass fil. 18–25 μ.

Huilla. Inter *Hapalosiphonem luteolum* et *Microsporam Löfgrenii*, &c., in uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus, et Utriculariis constituens; May 1860. No. 15. Etiam Morro de Lopollo; May 1860. No. 182.

This is distinguished from *S. panniforme* (Ag.) Born. & Flah. by its habit, its very different branching, its almost colourless sheath with smooth exterior, and by the round apices of the branches, as well as by its somewhat smaller size.

3. S. MINUTUM (Ag.) Hass. *Brit. Freshw. Alg.* i. 230; ii. t. lxvii. f. 3, 4 (1845); Born. & Flah. in *Ann. Sci. Nat.* 7e série, Bot. v. 72–74 (1887). *Scytonema minutum* Ag. *Synop. Algar. Scandin.* 117 (1817). Crass. fil. prim. 26 μ; crass. ram. 17 μ.

Huilla. In graminosis paludibus juxta rivulum de Lopollo; April 1860. No. 180.

4. S. INFORME Kütz. *Spec. Algar.* 319 (1849); *Tab. Phyc.* ii. (1850–2), 11, t. 38, fig. iii.; Born. & Flah. *l. c.* 75–77 (1887). Crass. fil. prim. 44–71 μ; crass. ram. 36–39 μ.

Pungo Andongo. Inter *Scytonema Myochrous* var. *chorographicum*, in summis rupib.; Febr. 1857. No. 6.

(To be continued.)

NOTES ON BRITISH PLANTS.*

By Arthur Bennett, F.L.S.

II.—CAREX.

The following notes are given in the sequence of the 9th edition of the *London Catalogue*, as they will thus be easier of reference: they will perhaps help to explain some of the changes in nomenclature therein made. They will also show the difficulty there is in determining with accuracy some of the species, especially in the *vulgaris* section. It is useless to attempt to resolve the discord of opinion as to what is a species, a variety, or a form; but a tendency in Scandinavian Floras to reduce many Friesian species to forms—whether rightly, or not, I do not pretend to decide—may be noted as one of the "direction posts" of the times. I will merely quote one instance. *Carex prolixa* Fries (1842) is reduced by Hartman to *C. acuta* var. *prolixa* (1843); and further degraded by Almquist in Hartman's 11th ed. (1879) to *C. acuta* forma *prolixa*. Taken in conjunction with the splitting of recent years, the above is an object-lesson.

Carex rupestris All. *Fl. Ped.* ii. 264 (1785). This seems much more plentiful in W. Sutherland than the first record would seem to intimate. Mr. Hanbury tells me it can be "pulled up in sheets two feet across."

C. microglochin Wahl. *Act. Holm.* 140 (1803). I should not be surprised to hear that the plant that occurs in Dick's Caithness locality is this, and not *pauciflora;* but Mr. Hanbury informs me that *C. pauciflora* occurs on Dunnet Links.

C. disticha Huds. var. longibracteata Schl. *Cat. Pl. Helv.* ed. 4, 11 (1821). The name as it occurs here is specific. See *Journ. Bot.* 1897, 145.

C. ligerica Gay in *Ann. Sc. Nat.* ser. 2, t. x. 360 (1838). *C. arenaria* L. var. *ligerica*. Richter makes this a hybrid, *C. arenaria* × *Schreberi*; Gay, Grenier & Godron, Nyman, and others, all call it a species. If it is a hybrid (which I doubt), it can hardly be our plant; but the name was determined by Boeckeler. I should like here to call the attention of British botanists to the valuable series of notes contained in Gay's herbarium at Kew, not only on the labels of the specimens, but in the MSS. in the library; it is strange that the French ever allowed such a splendid collection to leave France.

C. teretiuscula Good. in *Trans. Linn. Soc.* ii. 163 (1794). *C. teretiuscula* var. *crassior* Hartm. *Hand. Sk. Fl.* ed. 4 (1843). *C. teretiuscula* var. *major* Koch, *Syn. Fl. G.* ed. 2, 867 (1844). *C. Ehrhartiana* Hoppe, *Cent.* 207. *C. diandra* Schrk. *Baier. Flora*, 281 (1789), may be an earlier name for *C. teretiuscula*, but I have not seen an authentic specimen. Richter has restored *C. pseudo-paradoxa* S. Gibson, "*Phytol.* i. 53" (but the reference should be to

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* See *Journ. Bot.* 1894, 364.

i. 778 (1843), as a var. of *paradoxa*. This was found at Seaman's Moss Pits, near Manchester, and was the cause of a rather acrimonious discussion. In the *Lond. Cat.* of 1844 it stood as a var. of *C. teretiuscula*, and, judging by the specimens in the Boswell Herbarium, that is its correct place; it is near to, but not exactly the same as, Hartman's var. *crassior*.

C. PANICULATA L. var. RIGIDA Blytt *in litt.* Cfr. Blytt in *Christ. Vid. Selsk. Forsh.* No. 7, p. 8 (1886). Spikes more rigid, darker coloured, and with the spikelets more crowded.

C. MURICATA L. Richter has "var. *virens* Lam.," but it has been suggested that Lamarck's plant is not the same as Koch's. I cannot answer this query, for I have not seen a specimen of Lamarck's. Lang in *Linnæa*, xxiv. 516 (1851), makes Lamarck's plant a species.

C. ECHINATA Murray. *C. echinata β. grypos* Hartm. *Hand. Sk. Fl.* (1849). *C. grypos* Schkuhr, *Riedg. Nachtr.* 18, f. 193 (1806).

C. HELVOLA Blytt ap. Fries, *Bot. Not.* 58 (1849). Gathered by Dr. Balfour on Lochnagar three years before Blytt's plant was named, and labelled "*C. curta* var. *alpicola*," *Journ. Bot.* 149 (1886). There are other specimens that are probably this, but opportunity to dissect them has not yet been taken. Kihlman (*Medd. Faun. et Fl. Fenn.* 69 (1889)), considers *helvola* as hybrid between *C. lagopina* and *C. canescens* (*curta*); this may likely be the case, as on Lochnagar, where *lagopina* certainly grows near, and probably *curta*, or its var. *alpicola*.

C. APPROXIMATA Hoppe ex Hoffm. *Fl. Deut.* ed. 2, ii. 200 (1800). As there is an earlier *approximata* of Allioni, *Fl. Ped.* ii. 267 (1785) (now considered a var. of *ericetorum*), the name *lagopina* Wahl. *Act. Holm.* 145 (1803), may be restored. Richter has *C. Lachenalii* Schkr. *Car.* t. 7, f. 79 (1801). I have not seen a specimen.

C. CURTA Good. *β. alpicola* (Wahlb.). The enclosing brackets are not needed, as Wahlenberg described it as a variety (*Fl. Lapp.* 232 (1812)), but under *C. canescens* L. The proper name under *C. curta* seems to be var. *brunnescens* Pers. *Syn.* ii. 539 (1807). Nyman makes a subspecies of *C. vitilis* Fr. under *C. Persoonii*. Andersson joined it with *C. Persoonii* (Herb. Fl. Aust. n. 282, ex Lang. in *Linnæa*, xxiv. 539 (1851)). Have we in Britain any plant other than a variety of *C. curta?* I have seen no specimens that I could call *C. vitilis* Fr.; all seem, more or less, forms of *C. curta*, to the extremes of which var. *alpicola* may be applied. Dr. Boswell seems to have thought the same, for in the *Exch. Club Rep.* 1876, 87 (1878), he remarks: "This is all we have to represent *alpicola* in Scotland, and when cultivated it is scarcely to be distinguished from ordinary *curta*. I have some doubt if we have true *C. vitilis* in Britain."

C. OVALIS Good. There are perhaps older names for this, but certainty must be shown before they can be adopted. S. Gibson's var. *bracteata* does not seem to have been described, as he denies the identity of the Castle Morton plant, and called that *C. Malvernensis* (*Phytol.* i. 715 (1843)).

C. LEPORINA L. var. CAPITATA Sond. *Fl. Dan.* t. 2366 (1843); Sonder, *Fl. Hamb.* 489 (1851); Prahl. *Krit. Fl. Hol.-Sch.* 236 (1890). Andersson quotes (*Cyp. Sc.* 64 (1849)) Herb. Norm. f. 8, no. 77, for it. Mr. Miller gathered this in W. Sutherland in 1881, but has only recently sent it to me among many other Carices. It resembles *C. festiva* Dewey (*Sill. Journ.* 29, 246 (1836)), a rare arctic species. Sonder observes on it: "hat 3–5 dichtstehende, bräunliche Aehren und dadurch eine grosse Aehnlichkeit mit *C. festiva* Dewey" (*Fl. Hamb.* 489).

C. FUSCA All. *Fl. Ped.* ii. 269 (1785). *C. polygama* Schk. *Riedgr.* i. 84, t. 76 (1801), *teste* L. H. Bailey. *C. Buxbaumii* Wahlb. *Kongl. Ac. Handl.* 24, 163 (1803).

C. HUDSONII Ar. Benn. in *Lond. Cat.* ed. 9, 41 (1895). *C. stricta* Good.! *Trans. Linn. Soc.* ii. 196 (1794), t. 21, f. 9. *C. stricta* Lam. *Dict. Bot.* iii. 387 (1789), antedates Goodenough's name, and is the American *C. angustata* Boott in Hook. *Fl. Bor. Am.* ii. 218.

Var. TURFOSA. *C. turfosa* Fries, *Bot. Not.* 104 (1843).

C. ACUTA L., var. PROLIXA Hartm. *Hand. Sk. Fl.* ed. 4 (1843). *C. prolixa* Fries, *Nov. Mant.* iii. 150 (1842). In this the spikes are slightly drooping; the glumes, although described as subulate-cuspidate, are not so, like the *maritimæ* section, but gradually taper from the base to the apex, from half as long again to twice as long as the first. The habit is neater than in *acuta*. I have this from Norfolk (*Priest*), and in Herb. Brit. Mus. are specimens from Cambridgeshire gathered by Newbould.

C. ACUTA L. β. MINOR Led. *Fl. Ross.* iv. 314 (1853). *C. tricostata* Fries, *Nov. Mant.* iii. 152 (1842). Andersson refers to this *C. cæspitosa β. altissima* Aspegr. *Bleh. Fl.* 67 (1823), and *C. stricta* var. *fluviatilis* Laest. in *Nov. Act. Upsal.* xi. 286 (1839). It is exactly the reverse of *prolixa*; the glumes of the female spikes are only half the length of the fruit, and blunt, the bracts less foliaceous, and the habit of the plant like that of *stricta*. I have specimens named by Dr. Christ as above from Ireland (*S. A. Stewart*).

C. RIGIDA Good. in *Trans. Linn. Soc.* ii. 193, t. 22 (1794). The original specimens in Goodenough's herbarium at Kew are about equal to what Fries called var. *saxatilis*: our small curved plant is similar to his *glacialis*. In *Journ. Bot.* 1890, pp. 171–3, Prof. L. H. Bailey makes *rigida* the type of a composite species, which includes *Goodenowii* Gay, *rigida* Good., and various others; and remarks: "There is so gradual a blending of types from the top of Mount Washington, where *C. hyperborea* grows, to the adjacent sea-coast, where *C. vulgaris* is common, that there can be no doubt as to the specific identity of the two plants." This may be the case in America, but is not borne out in Great Britain. It is rare that there is any difficulty in separating *C. rigida* from *Goodenowii*, even when growing at the same elevation in Scotland. I am by no means averse from combining species which one can see the reason for so doing, but among the many hundreds of specimens that I have seen this combination does not seem to be justifiable. To my eyes Prof. Bailey separates some American species from others the distinctness of which I should have doubted. I say this to show the difficulty there is in naming plants of this section with certainty. Thus at p. 19 of his able paper on "The Types of various Species of the Genus *Carex*" (1889), Prof. Bailey remarks under *C. variabilis* "nov. sp.": "*C. aquatilis* is marked by its abundance of comparatively broad and long leaves and bracts, *the solid spikes* [the italics are mine], very broad perigynia, and minor characters." Now in our montane form of *aquatilis* the spikes are not only much attenuated below, but even often interrupted (just as in his var. *elatior* of *C. variabilis*); and so are Swedish specimens from Jemtland (*Dr. Almquist*); so that that character will not suffice to separate *aquatilis*. He certainly allows that the American material (of *aquatilis*) "is yet scant"; and at p. 60 remarks: "It is not certain that the American plant is the same as the European." I have seen what I believe to be *aquatilis* from Canada (I exclude *C. stans* here). And in Scotland we have forms of *rigida* that come so close to *aquatilis* that it is not easy to separate them in a dried state; certainly it is more difficult than to separate *Goodenowii* and *rigida*.

In ed. 8 of the *London Catalogue* a var. *inferalpina* Læst. was introduced on faith of specimens so named by Dr. Almquist from the Clova table-land. Prof. Bailey in his paper considered that this exactly represented *C. hyperborea* Drejer (*Rev. Crit. Car. Bor.* 461 (1841)); a plant that has been split up into three parts, and divided between *salina*, *limula*, and *epigejos* Hartm. (non Fries). If Prof. Bailey is right (and I believe he is from the specimens I have seen), so I believe was Almquist, and that our plant is as good *hyperborea* as that of Lapland. In the 9th ed. that name was left out (from the uncertainty then felt), but meanwhile I had seen specimens that I thought must be named *C. limula* Fr. (*Summ. Veg. Scand.* 229 (1846)). If we take the plate of *Fl. Danica*, it certainly points to a *rigida* form, and the specimens also; yet we have Andersson's drawing of the leaf-margin against it. It looks very different from our usual *rigida*, and forms connecting the two in Scotland are not common, though they do occur by rills, &c. (as suggested to me by Mr. Beeby). In Scandinavia these forms are much more common. In *Eng. Bot.* x. 112, Dr. Boswell remarks under *rigida*: "In marshes on Loch-na-gar, and also on Little Craigendal, near the station for *Astragalus alpinus*, however, I have gathered a form which closely approaches *aquatilis*." In the Boswell herbarium there are several sheets of this plant, some named "*aquatilis?*," some "*rigida?*," and others not named. To me they are clearly a form of *rigida* and not *aquatilis*, for though the leaves are not strongly revolute, they may be called *subrevolute*, and I cannot see how they differ from *limula*. I have not seen the Little Craigendal plant, but similar specimens to those from Lochnagar occur on the Clova table-land; and along with them, but much more rarely, others I cannot separate from *C. hyperborea*. I cannot see much difference in these two plants, nor could Dr. Boott; and if one contrasts the two plates, *Flora Danica*, their likeness is much more apparent than their difference.

Nyman limits *hyperborea* to "Island, Faroe," yet Drejer himself says "Lapponia, Laestadius in herb. Hom.," and though Drejer, Boott, and Bailey all say "*vulgaris* section," yet he places it in the *maritimæ;* Lange, *Consp. Fl. Groen.* 145 (1885), puts *hyperborea* next *rigida* under "Folia latiora plana = *Rigidæ* Lang (not Lange)."

In *Trans. Glasgow Nat. Hist. Soc.* 110 (1888), Mr. P. Ewing described a new British *Carex*, "*C. spiralis* Ewing," from near the ridge between Forfar and Aberdeenshire. This is one of the *rigidæ*, and one of his specimens might well have supplied the drawing of *C. hyperborea* in Anderss. *Cyp. Scan.* t. 5, f. 47 (right hand fig.). I have not seen it mentioned in any of our Floras that Dr. Boott has in his herbarium referred to "*C. vulgaris* Fr. var. *limula* (*hyperborea*)," a specimen "from the Menai Bridge, Mr. Bowman."

C. AQUATILIS Wahl. in *Act. Holm.* 165 (1803). The lowland specimens placed under this vary considerably; perhaps the nearest to the majority of Wahlenberg's *aquatilis* are those from Kerry and the Thurso river, Caithness, while those from Kirkcudbright have much the aspect of some *salina* forms. The *Fl. Danica* plate 2477 (*C. stans* Drejer) might almost have been drawn from some of my Scotch specimens, with the exception of the "spica mascula 1" of Drejer's description. Boott, Bailey, and Hjelt all call *stans* an *aquatilis* form. Nyman does not admit it for Europe, but Hjelt in *Fl. Fennica*, 269, says, "In ora septentrionale Lapponiæ ex Almquist dominatur, etiam in interiore parti obvenit." But almost all manner of forms occur, some nearly connecting the mountain forms; and if we accept the thinner spiked lowland plants as fairly representing Wahlenberg's original specimens (and they match some of them very closely), then the stouter spiked forms not attenuated below may retain the name of var., or forma of *elatior* Bab. = *Watsoni* Syme. The var. *cuspidata* has much the aspect of some of the forms of *C. halophila* Nyl., which, according to Hjelt, is *C. aquatilis* × *salina* * *cuspidata;* and he remarks that a specimen from "Kantalaks," Herb. Norm. fas. 12, No. 85, under the name of *aquatilis cuspidata*, is "*C. halophila affinis*," by this meaning the subsp. *affinis*. Out of the British lowland plants some six or seven forms might be evolved.

Remarking on specimens of the lowland form sent to the Ex. Club in 1876, Dr. Boswell said: "This seems really the type of the species." From the fact that Wahlenberg says "sæpe altitudinum humanum attingens," it was doubted whether our mountain form could be the same. The late Dr. Buchanan White sent me an interesting form from the White Myre of Methven; this Dr. Almquist referred to "*C. aquatilis* var. *epigejos!* Laest." I have never succeeded in seeing a type of Laestadius's plant, but I have not doubted the name until I saw the account of this in Hjelt's *Fl. Fennica*. There it is considered to be *C. aquatilis* × *rigida*, and Dr. Almquist says the genuine plant is so. If this is so, I hardly see how such a plant could occur in a lowland Perth marsh. If I had to suggest a hybrid origin for Dr. White's plant, I should say *C. aquatilis* × *Goodenowii juncella*, but Hjelt says that specimens named *C. arcuata* Laest. (*Bid. Kann. i. Tornea Lapp.* 43 (1860)) in

Backman and Holm's *Oest.-och.-Lapp.* 237 (1878) are "*aquatilis* × *vulgaris juncella.*" I have not seen *arcuata*, but the description of its surroundings by Laestadius does not seem to exclude our plant, though of course the vegetation is really more boreal. Mr. Barclay tells me they have not succeeded in finding *C. aquatilis* on the White Myre, though it has been searched over since 1878.

A specimen sent by Mr. Barrington from Lough Ree, Ireland, was named *C. turfosa* f. *elongata* by Dr. Lange; placing this by the side of the Perth plant, it is difficult to find any real difference, and I would say they are substantially the same, and, likely enough, *C. aquatilis* × *Goodenowii juncella*; *aquatilis* × *rigida* very improbable.

Hjelt says that specimens named *epigejos* Laest. come under three forms:—

1. *C. aquatilis* × *rigida*, the original plant.
2. A small form of *aquatilis*.
3. The Arctic *C. stans* Drejer.

To show the close connection of these forms he says a plant from "Kantalaks," Lapponia pingensis F. Nylander, is named *C. turfosa?*; and that Fries Herb. Norm. f. 12, 89, called by Hartman *aquatilis epigejos* Laest., is *C. salina flavicans* × *rigida*, according to Almquist.

The forms of *aquatilis* we seem to possess are:—

1. *C. aquatilis* var. *cuspidata* (Laest.) Fries, *Bot. Not.* 104 (1843). I follow Andersson in quoting Laestadius for this, but it seems to me that Laestadius's name of *C. aquatilis* var. *subacuta* (*Nov. Act. Upsal.* xi. 287 (1839)), is the same thing. This has the glumes elongated and cuspidate as in the *maritimæ*.

2. *C. aquatilis virescens* Anders. *Cyp. Scand.* 46 (1849). Just the opposite to the last; the glumes half the length of the fruit, which is very symmetrically arranged.

3. *C. aquatilis minor* Boott, *Ill. Carex.* iv. 163, t. 545. The montane plant with the spikes attenuated at the base, from the confines of Forfar, Aberdeen, and An Beinnan, Perth. There is nothing that exactly matches this in Europe, although very near; but our plant has a facies that is distinguishable.

4. *C. aquatilis* var. *elatior!* Bab. *Man. Brit. Bot.* ed. 1, 341 (1843). *C. aquatilis* var. *Watsoni!* Syme *Eng. Bot.* ed. 3, v. 113, t. 1642 (1870). The lowland plant, usually with the spikes stout, equal, and continuous, leafy bracts, and tall (3–5 feet) stems; between this and *minor* come some forms we have.

5. *C. aquatilis* var. *epigejos* Laest. (if the Perth plant?). Narrow-leaved, strict, spikes thin, glumes dark, male spike (1 or 2) very dark, stem slender. *C. aquatilis* var. *epigejos* Laest. *Vet. Ak. Handl.* 339 (1822). *C. epigejos* Hartm. (non Fries). *C. borealis* Lang in *Flora* 142 (1843), teste Beurling. We are here met by a difficulty in nomenclature that is not easy to unravel. Lang in *Linnæa* (xxiv. 563 (1851)) notes that his name appeared in April, 1843, while that of Fries appeared in July, 1843; but Lang refers both Laestadius's plant, and Fries's to his species. I have not been able to see a specimen of *borealis* named by Lang, but from his remarks on that plant I have little doubt he refers to that of Laestadius; if

so, his contention as to date will not apply, as Fries's plant is a *salina* form. Richter puts the plant of Fries (*Mant.* iii. p. 146), Lang's *borealis*, and Nylander's *arctophila* * under *hyperborea* Drej. as a var. of *aquatilis*. He seems to ignore the *Bot. Notiser* description of *epigejos* Fries (1843), as he quotes the *Summa* (1846) for it. But even if we admit Lang's plea, Fries had in his *Mant.* iii. 146 (1842), made a subspecies of *C. epigejos*, and curiously enough, at the same place, makes Wahlenberg's *salina* a var. of *aquatilis*. So mixed up have these Carices been, that I may have fallen into error respecting them. Blytt in *Norges Flora* simply calls *C. epigejos* Fries a *salina* form, but neither there, or in his *Nye bidrag* of 1892, does he mention *C. borealis* Lang, though in the former he duly quotes *C. bolina* Lang; yet Lang has "Norvegiæ" after *borealis*. I am inclined to think the Perth plant is *C. arcuata* Laest.; but it is impossible to be quite sure without seeing an authentic specimen. *C. aquatilis* has been found in England (Lake Lancashire).† Most of the specimens of Wahlenberg come between Nos. 3 and 4.

× **Carex Grantii** Ar. Bennett, sp. n. *C. aquatilis* × *kattegatensis* Fries. Growing with the two mentioned Carices on the Wick river in Caithness. This is not *C. halophila* F. Nyl., which Hjelt refers to *C. aquatilis* × *salina* * *cuspidata*, though it has somewhat the habit of that plant; but the spikes of that are paler in colour, longer, and the lower part generally attenuated, with longer peduncles, and it has more an *aquatilis* look, while this has that of *salina*. What *C. vaccillans* Drejer may be I do not know, but Nyman puts it under *hæmalolepis* Drej. as a subspecies. Almquist says the Christiania plant is a form of *C. kattegatensis* Fries. This plant of Drejer seems a very scarce form; I have never seen a specimen so named in any herbaria, and both Beurling and Lang say "mihi ignota." Nyman makes *C. salinoides* Beurling the same, but Beurling says his plant is "*C. salina* Hartm. ed. 5, non Wahlb. Herb. Nor. f. 8, No. 72." I am unable to place *C. Grantii* with any named form, and suggest the above name after the discoverer of *kattegatensis* in Britain. Greener than *kattegatensis*, with much shorter spikes, less attenuated towards the base, shorter glumes, green and paler, the first broader, aspect of the whole plant intermediate between the two, with a tendency to *salina*; this is not a form of *kattegatensis* simulating *aquatilis*, as Almquist suggests one of Nylander's does from Österbotten (*Bot. Not.* 128 note (1891)), but seemingly a hybrid, so far as it is possible to judge without direct experiment.

× **Carex hibernica** Ar. Bennett sp. n. *C. aquatilis* × (*stricta*) *Hudsonii*. I have in vain tried to place this under some described form; in habit it strongly reminds one of *C. Buekii* Wimmer *Fl. Schl.* ed 3, 81 (1857); but that has strongly webbed lower sheaths, fruits inflated so as to project the tops of the glumes in a peculiar manner, glumes much paler, narrower; the spikes attenuated below, and the leaves much wider. Differs from *aquatilis* in the very dark subrotund glumes, with a very narrow central nerve, the very blunt, rounded and regular male glumes (in most Carices the male glumes are often irregular and afford no characters); broader, subrotund fruit very faintly nerved at the base; the shorter stricter spikes, and the male spike, one only in the specimens seen: from *stricta*, in the basal portion of the stem, which is coloured; and *aquatilis*-like, in the shape of the fruit and glumes of both male and female spikes, in the sheaths being non-fibrillose, and in the fruit, which is almost nerveless and subrotund. My specimens were gathered by Mr. R. W. Scully "on Galway's river, Old Kenmare Road, Co. Kerry, ·15, 6, 89." From the same locality I also possess *C. aquatilis* from Mr. Scully. In *Journ. Bot.* 1889, 91, Mr. Scully records *C.* (*stricta*) *Hudsonii* from "several places about Lakes of Killarney." The *aquatilis* is from "near Upper Lake, Killarney" (*Journn. Bot.* 1890, 116).

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* Spicil. *Fl. Fennica Cent.* 3, 14 (1846).

† See *Yorkshire Naturalist*, 1897, 77.

C. SALINA Wahl. * KATTEGATENSIS (Fries). *C. kattegatensis* Fries *Ind. Sem. Hort. Ups.* (1857). The occurrence of this in a second Scotch county by the Beauly Frith was of much interest to me, as I had predicted its possible occurrence there when writing of the Caithness plant in the *Exch. Club Report* for 1884, p. 118 (1885). I believe now that another *salina* form can be added to our Flora, though it must be very rare, as I have only succeeded in finding three specimens in herbaria as yet,—one in my own collection, one in the Kew Herbarium, and one in the Boswell Herbarium. I believe these are *C. epigejos* Fries (non Laest.), *Bot. Not.* 105 (1843), *Summ. Veg. Sc.* 233 (1846). This has been variously treated by authors. Fries, in his original description, gives as a synonym "*C. aquatilis β. epigejos* Laest.," but this has since proved incorrect. After this reference he adds, "*C. aquatilis* Hook. *Brit. Fl.* iv. 336," but with no mark of certainty. My specimen was sent me by the late Dr. B. White, and labelled "The mountain form of *C. aquatilis*, Caenlochan, Forfar." Now the fruit and glumes seem to me a *salina* form, and not *aquatilis* or *rigida* form. Andersson puts it among his "*bicolores*" on the strength of Nylander's description of his *C. discolor* Spic. *Fl. Fenn.* iii. 12 (1846). Nyman so places it, but it may be a slip for *C. bicolor* Nyl., which he puts to *C. epigejos* Fr. Almquist and Hjelt refers Fries's plant to a *salina* form. The original specimens of this were odd, and although there was a terminal male spike, it was so shortened, and the glumes elongated, as to appear sessile on the upper female spike, and it had at its base female flowers; but this was, I believe, only an arrest of growth, and in other specimens the spike was elongated, but still with female flowers at the base. But this condition of the male spike (sub-androgynia Fr.) is not that of the true *bicolores;* i. e. *C. bicolor* All. and *C. nardina* Fr. Nyman, in a note No. 257 *Consp. Fl. Europ. Supp.* ii. 375 (1890), follows Mr. Ridley in *Journ. Bot.* 1885, 289–91, in quoting the *Summa* for this; certainly the description is longer, and Fries speaks with less certainty; but on the whole the original description is applicable, though confused with Laestadius's plant.

If I am correct in these notes, we may sum them up thus,—that the reference of the Forfar-Aberdeen *rigida* var. *inferalpina* was correct (though mixed with others); that it is substantially *C. hyperborea* Drej.; that another form occurs with the habit of *aquatilis*, but is a *rigida* form, *i. e. limula* Fr.; that a third form occurs that is *rigida* altered in growth by growing by rills (as suggested by Mr. Beeby); that Dr. B. White's plant is *C. epigejos* Fr., but not of Laestadius; and that one at least of our lowland *aquatilis* forms is near *C. stans* Drej. (except that it has more than one male spike).

C. spiculosa Fries *Bot. Not.* 99 (1843). *Summ. Veg. Scand.* 226 (1846), forma nov. *Hebridense*, Ar. Benn. *C. salina cuspidata* × *Goodenowii, juncella*, teste Almquist, *Bot. Not.* 128 (1891). Dr. Almquist agrees with me in considering that the specimens of *Carex* gathered by Mr. Duncan in Harris, Outer Hebrides, are the nearest to *spiculosa* of any named form, the only appreciable difference being the want, in the Hebridean specimens, of the serrulate glumes (although they are equally as elongated) of Fries's plant. This plant of Fries is one of the rarest Carices; it occurs on the Kamschatka promontory on the White Sea, in Russian Lapland (Karelia keretina of the Finnish botanists); and perhaps at "Suma in Karelia pomorica," but the latter Almquist considers may be *C. salina* * *cuspidata borealis* × *Goodenowii*. This plant is usually quoted as of Fries, but there is some probability that Nylander in *Spicil. Fl. Fenn.* 2 (1843), was really earlier. But I cannot ascertain whether the *Spicilegium* was published before or after July in 1843, the month in which the *Notiser* was published. Hjelt quotes "*C. spiculosa* Fr. & Nyl.," and says, "Spec. 2, p. 21, ubi primum describiter." The difficulty with our plant is to find the *salina* parent; the only other Carices Mr. Duncan can find in the neighbourhood are *C. glauca* and two forms of *C. Goodenowii*. The peculiar colour is very marked in our plant. W. Boott, in *Bot. Gazette*, ix. 88 (1884), gives a "*C. spiculosa ?*" from "brackish marshes near Boston, Mass." Prof. Bailey suggests "*C. stricta* Lam. × *salina*" (*Proc. Am. Ac.* 3, 85 (1886)). It is a very curious plant, but is not the plant of Fries. Lang, in *Linnæa*, xxiv. p. 552 (1851), observes:—"Cl. Friesius *Caricum spiculosam* ad stirpem *C. maritimæ* refert, sed ut mihi videtur, transitum optime facit a *Cæpitosis* ad *Salinas*."

(To be continued.)

SHORT NOTES.

Rubus Drejeri G. Jensen in Somerset.—A few weeks ago Mr. Rogers and myself had the pleasure of a short visit from Mr. Gelert, the Danish batologist. One result of this visit is that a number of closely-allied brambles from W. Somerset, which we had placed under *R. scaber* Wh. & N. (though with considerable hesitation, especially on the part of Mr. Rogers), have been determined by Mr. Gelert as "good *Drejeri*." I believe that this is the first record for England of *R. Drejeri* (segregate). *All* the plants recorded in the

Flora of Somerset under the name of the *R. scaber* must now be cancelled, *with one exception*. The peat moor plant (District 8) is said to be *R. ochrodermis* Ley. Those of Districts 1, 2, 3, and 6 must be placed under *R. Drejeri*. I have, however, a single specimen of *R. scaber* from Dulverton (District 1), which has been vouched for both by Dr. Focke and Mr. Gelert.—R. P. MURRAY.

SCIRPUS CARICIS Retz. (p. 146).—The Rev. R. P. Murray points out to me that this sedge occurs in N. Somerset (it is given in his *Flora* of the county for half a dozen localities), and that, while new to Devon, it is consequently not an addition to the peninsular province. My specimens came from the immediate neighbourhood of Lynmouth or Lynton; the exact locality has escaped my memory. —E. F. LINTON.

NOTICE OF BOOK.

Aide-mémoire de Botanique Cryptogamique. Par Prof. HENRI GIRARD. Paris: Baillière et Fils, 1897. 3 fr. Pp. 284; 107 figs.

UNDER the general title of the *Manuel d'histoire naturelle*, Prof. Girard has compiled a series of ten little volumes, in which he has essayed to summarize what is known of the several branches of the subject. To botany are devoted three of the volumes; and one of these is the book under notice. It is divided into four parts, the first of which treats of such generalities as the cell and cell-structure, and reproduction. In the second the thallophytes are discussed, under the heads Fungi, Algæ, Lichens, and Bacteria. In the third and fourth parts follow the Muscineæ and the Vascular Cryptogams. In a plain narrative, free from all verbose embellishment, the main facts of the life-history and structure of these groups are set forth with sufficient clearness and tolerable accuracy. Classification of the kind common to text-books is added; and such fossil forms as are known receive notice. No authorities are quoted; no alternative explanations of phenomena are alluded to; the places of origin, from which the figures in the text were taken, are in no case indicated. One feels impelled to ask, "What is the value of the book?" The smart person gives the obvious answer, "Three francs." But, setting aside the price, one would like to know whether the student, for whom the author has expressly catered, will do himself good or harm by perusing this compilation. The wise student will doubtless benefit by it, being able to replenish the meagre narrative with the rich stores of knowledge acquired from text-books and lectures. The foolish student, however, who endeavours to cram up his subject at the last moment from books of this character, is likely to find that the light gained from them will fail at the critical moment. Students mindful of their best interests must use the book strictly with a view to stimulate their jaded and overcharged memories, and not with the purpose of gleaning fresh facts, which can be better studied in more authoritative works.

A. G.

ARTICLES IN JOURNALS.[*]

Bot. Centralblatt (No. 13).—W. Grevel, 'Anatomische Untersuchungen über die Familie der *Diapensiaceæ*' (No. 14). — G. Lindau, 'Ueber die heutige Systematik der Pilze' (No. 15).—A. Zalewski, 'Ueber M. Schoennett's 'Resinosystem' (Nos. 17–20).—C. Hartwich, 'Ueber einige bei Aconitumknollen beobachtete Abnormitäten' (No. 17).—F. Ludwig, '*Sarcosoma platydiscus* im Vogtland.'

Bot. Gazette (March 24). — C. J. Chamberlain, 'Life-history of *Salix*' (7 pl.).—C. E. Burnap, 'Notes on *Calostoma*' (1 pl.). — F. A. Waugh, 'Definiteness of Variation' (Ap. 22). — J. Donnell Smith, 'Undescribed Plants from Guatemala, &c.'—J. H. Schaffner, 'Life-history of *Sagittaria variabilis*.' (7 pl.). — J. N. Rose, 'N. American species of *Chrysoplenium*.'—G. E. Davenport, '*Botrychium ternatum* var. *lunarioides*.' — C. Robertson, 'Myrmecophilous dissemination.'

Bot. Notiser (Häft. 3).—H. Hesselman, 'Några iakttagelser öfver växternas spridning'.—L. M. Newman, 'Om nomenklatur och artbegränsning inom slägtet *Sparganium*.'—O. Nordstedt, 'Sötvattensalger från Kamerun.'—Id., 'Sammanställning de skandinaviska lokalerna för Myxophyceæ hormogonieæ.'

Bot. Zeitung (April 16). — H. Solms-Laubach, '*Lilium peregrinum*, sine fast verschollenes weisse Lilie.'

Bull. de l'Herb. Boissier (April).—C. Komanoff, 'Sur quelques structures foliaires.' — F. Hildebrand, 'Ueber die Knollen und Wurzeln der *Cyclamen*-Arten.'—A. Chabert, 'Des plantes sauvages comestibles de la Savoie.'—G. Romy, 'Questions de Nomenclature.' —C. J. Forsyth-Major and W. Barbey, 'Ikaria.'—H. Schinz, &c., 'Die Pflanzenwelt Deutsch-Südwest-Afrikas' (May).—R. Chodat, 'Etudes de Biologie Lacustre' (3 pl.: *Sphærocystis Sticholœoa*, genn. nov.).—P. Conti, 'Du genre *Mathiola*' (*M. sinuata* and *M. rupestris*). —O. Tchonproff, 'Fractionnement du bois axial chez *Mendoncia Schomburgkiana*.'—H. Hallier, 'Bansteine zu einer Monographie der Convolvulaceen.'—R. Maire, 'Sur un nouveau *Cycadeospermum* de l'Oxfordien.'—E. Fischer, 'Schweizerischen Rostpilze.'

Bull. Torrey Bot. Club (March 30).—G. N. Calkins, 'Chromatin-reduction and Tetrad-formation in Pteridophytes' (2 pl.).—K. C. Burnett, 'Influence of light on dorsiventral organs' (1 pl.). — A. Hobrick, 'New fossil Grass from Staten Island' (*Phragmites Aquehongensis*: 1 pl.).—J. B. Ellis and B. M. Everhardt, 'New Fungi' (*Cryptophallus*, gen. nov.).—C. L. Pollard, 'Flora of Central Gulf Region' (Ap. 24).—J. K. Small, 'Sessile-flowered *Trillia*; Notes on *Epilobiaceæ*' —J. W. Harshberger, 'Ecological study of *Talinum*' (1 pl.).—P. A. Rydberg, 'Rarities from Montana (2 pl.). — G. V. Nash 'American Grasses.'—M. A. Howe, '*Gyrothyra*, a new genus of *Hepaticeæ*' (2 pl.).—L. M. Underwood, 'American *Hydnaceæ*.'— A. M. Vail, *Kallstrœmia brachystilis*, sp. n.—J. B. Ellis and F. D.

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[*] The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Kelsey, 'New W. Indian Fungi' (*Aecidiella*, gen. nov.)—J. K. Small, *Clematis Gattingeri*, sp. n.

Erythea (Mar. 31).—E. W. D. Holway, *Puccinia cretica*, sp. n. —W. L. Jepson, 'Explorations of Hartweg' (Ap. 30).—J. B. Ellis and E. Bartholomew, 'New Kansas Fungi.'—A. G. Merritt, 'Pollination of Californian mountain flowers.'

Gardeners' Chronicle (Ap. 3, 17).—M. T. Masters, 'The Species of *Thuja*' (Ap. 3). — *Galanthus cilicus*, sp. n. (May 15, 22). — W. T. T. Dyer, 'Progress of the Cyclamen' (May 22). — *Bolbophyllum ptiloglossum* Wendl. & Kränzl., sp. n.

Journal de Botanique (Ap. 1).— — Nadeaud, 'Plantes rares de Tahiti.' —L. Gaucher, 'Sur l'ovaire des *Punica granatum*.'—(Ap. 16). P. van Tieghem, 'Sur les caractères des Grubbiacées.' —(Ap. 16, May 1). E. Bescherelle, 'Révision du genre *Ochrobryum*.' — F. Kränzlin, *Mystacidium Hariotianum*, sp. n. — (May 1, 16). A. Franchet, '*Isopyrum* et *Coptis*.'—(May 16). C. Sauvageau, 'Les algues marines du Golfe de Gascogne.'

Malpighia (ann. xi. fasc. 1–3).—P. Baccarini, 'Sulla *Genista ætnensis*.'—F. N. William [s], 'Sulla *Medicago Echinus*.'—E. Paratore, 'Sulla presenza d'un fascetto leproso soprannumerario in una radice secondaria di *Dolichos melanophtalum*.' — C. Casali, 'Nuovi Micromiceti.' — E. Chiovenda, 'Piante nuove o rare da aggiungersi alla Flora Romana.'

Nuov. Giorn. Bot. Ital. (April).—K. Müller, 'Prodromus Bryologiæ Bolivianæ' (concl.).—U. Valbusa, 'Note floristiche.' — L. Beissner, 'Conifères de Chine' (1 pl.).—E. Baroni, 'Sopra alcune Aracee cinesi' (1 pl.). — G. del Guercio, 'Intorno ad alcuni Cecidii della *Santolina* dei *Dendrobium* e delle *Cattleie* (2 pl.).—S. Sommier & E. Levier, 'Plantarum novarum Caucasi.' — J. Baldrati, 'Struttura anatomica della perula del bulbo di alcuni *Allium*.'—G. Maltenici, 'Placche sugherose nelle piante.'

Oesterr. Bot. Zeitschrift (April & May). — J. Hoffmann, 'Zur Gattung *Odontites*.' — V. Folgner, 'Zur Systematik und pflanzengeographischen Verbreitung der Pomaceen.'—(April). V. Schiffner, 'Musci Bornmülleriani.' — G. Kükenthal, 'Caricæ orientales.'—E. v. Halácsy, *Achillea Urumoffii*, sp. n.

BOOK-NOTES, NEWS, &c.

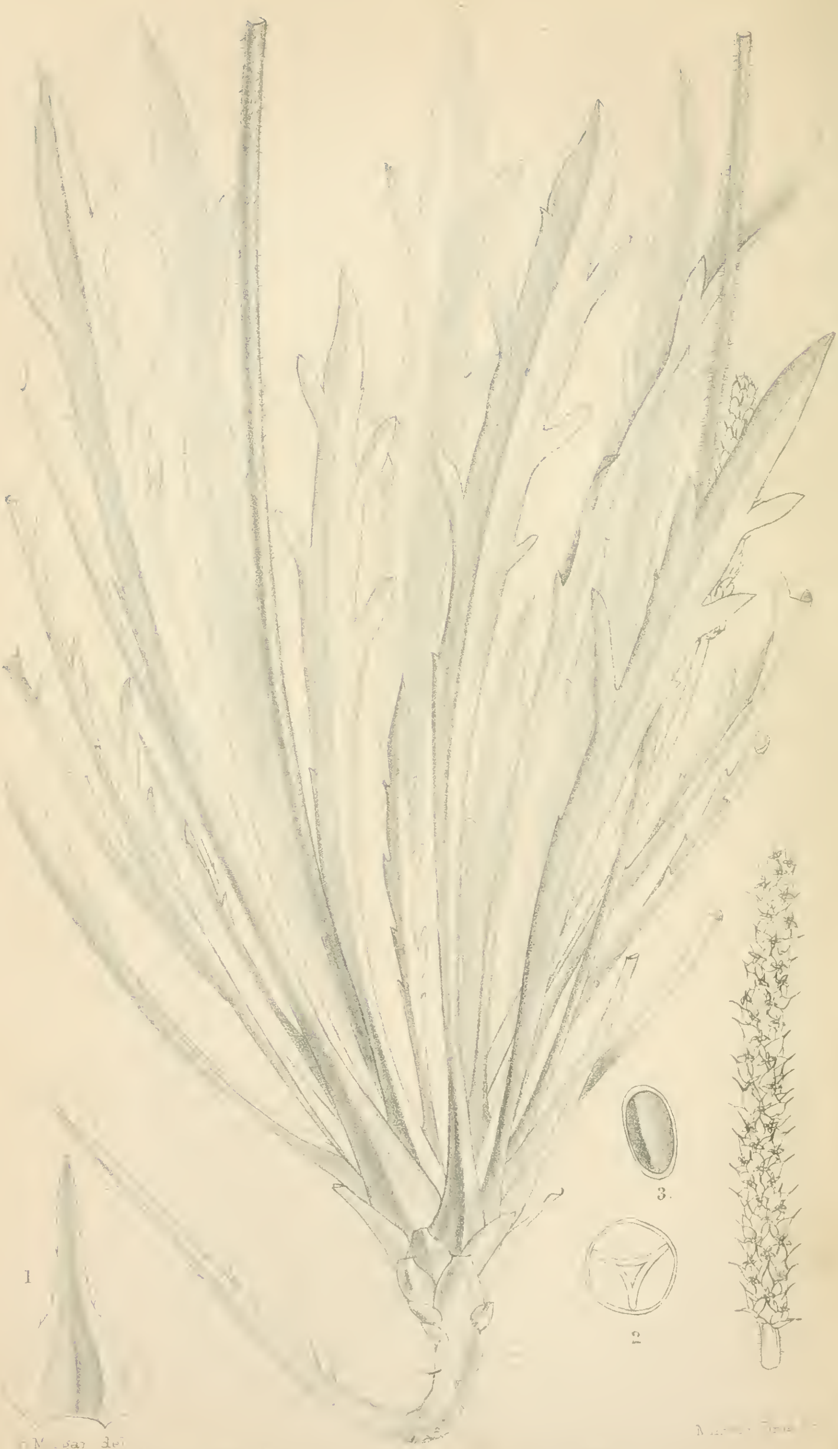
At the meeting of the Linnean Society on April 1st, Mr. G. R. M. Murray exhibited several lantern-slides of coccospheres and rhabdospheres, prepared from specimens collected by Capt. Milner, of the s.s. 'Para,' while on a voyage to Barbados, including all the forms figured in the 'Challenger' Report. Of these remarkable organisms Mr. Murray gave a detailed account, explaining the formation of coccospheres (so named by Dr. Wallich) as the aggregation into spheres of the so-called coccoliths described by Huxley from deep-sea soundings taken in the North Atlantic by H.M.S. 'Cyclops.' The calcareous scales (or coccoliths) were shown to overlap each other, and to constitute not only a defensive armour, but from their arrangement to admit of the growth of the organism, which is thus not limited by its calcareous coat, as diatoms are by their siliceous shells; each coccolith being attached to the cell by a button-like projection on its inner surface. In the rhabdospheres with projecting rods, of which figures were shown, the plates (rhabdoliths) do not fit into each other as figured in the 'Challenger' Report, but their bases are imbedded on the surface of the cell each by itself without contact. As to the cell-contents, the exhibitor had found nothing more than a granular material resembling protoplasm. There was no trace of colouring matter in the specimens, all of which had been brought up from a depth of three fathoms.

We regret to record the death of Samuel James Augustus Salter, F.R.S., which occurred on Feb. 28th at his residence, Basingfield, Basingstoke, in his seventy-third year. Mr. Salter, who for many years held a leading position in medical circles, and whose name was intimately associated with dental surgery, was at one time a familiar figure at the meetings of the Linnean Society, of which he became a Fellow in 1853. To vol. xxiv. of the *Transactions* of that body he contributed a remarkable paper "On a Sexual Monstrosity, consisting in the Development of Polleniferous Ovules, in two Species of *Passiflora*."

Many students of cryptogamic botany in this country doubtless have plants which they would be glad to dispose of in exchange for foreign specimens. An opportunity for doing this is afforded by the Vienna Exchange Office for Cryptogams, which is conducted by Herr J. Brunnthaler, Igelgasse 11, Vienna, iv/2., from whom we have received a catalogue for the current year. Some 3000 priced specimens are offered for exchange or purchase, and comprise Mosses, Hepatics, Fungi, Lichens, Algæ, and microscope preparations. In the future, Vascular Cryptogams and Bacteria will also be included. The valuation depends upon the quality and rarity of the specimens, the unit of value being represented by one-twentieth of a shilling. The commission exacted by the Exchange is 25 per cent. of the specimens sent in to the office. The specimens must be in good condition and properly labelled; the actual regulations to be observed, however, are too numerous to mention here. The catalogue, the essential parts of which are given in German, French, and English, costs sixpence; and, it should be added, contains descriptions of some new species of Fungi. Lists of the plants offered for exchange must be sent to the office by September 15th.

We have not been able to give our list of the actual dates of publication of the Kew *Bulletin* for 1896—a list which we are glad to know has been found useful—because the number for December last has not yet appeared. Only one number has been issued during the present year—that for January.

Mr. George Murray and Dr. D. H. Scott have been elected Fellows of the Royal Society.



R. Morgan del.

Mintern Bros. lith.

Plantago Coronopus, L. var. ceratophyllon, Rapin.

PLANTAGO CORONOPUS VAR. CERATOPHYLLON.

(PLATE 371.)

[MR. E. G. BAKER publishes in the *Proceedings* of the Dorset Natural History and Antiquarian Field Club (vol. xvii.) an account of this variety, which he found near Charmouth, Dorset, in 1895. The plant presented certain marked features which induced him to compare it with foreign forms, and, with the assistance of Prof. Henriques, who has seen authentic material, he has identified it with *P. ceratophylla* Hoffm. & Link—a plant which both botanists agree cannot be maintained as specifically distinct from *P. Coronopus*. By the courtesy of Mr. Mansel-Pleydell, we are enabled to reproduce the plate with which Mr. Baker's paper is accompanied in the Dorset *Proceedings*. The characters of the two plants are thus contrasted by Mr. Baker; and to these are appended the principal points of interest in his paper.—ED. JOURN. BOT.]

P. Coronopus L.	*P. ceratophylla* Hoffm. & Link.
Root generally slender, annual or biennial.	Root long, thick, probably perennial.
Leaves generally spreading flat on the ground, more rarely suberect, strap-shaped or linear, 1-nerved, usually furnished with narrow acuminate ascending lobes, rachis generally not so long as *P. ceratophylla*.	Leaves suberect, hairy, oblanceolate in outline, generally 3-nerved, occasionally 5-nerved, rachis broader than in *P. Coronopus*, apex acute or subacuminate, segments lanceolate, remote, occasionally toothed, acute or subacuminate, rachis 6 in. long, sometimes longer.
Scape usually exceeding the leaves.	Scape longer than the leaves towards the apex, rather more hairy than in *P. Coronopus*.
Heads of flowers ¼–1 in. or more long.	Heads of flowers 1, 3, or 4 in. or more long.
Bracts acuminate, longer than the sepals.	Bracts acuminate, longer than the sepals.
Capsule 3–4-locular, 3–4-seeded.	Capsule trilocular (in the original description), described as 2-seeded, but, judging from herbarium specimens examined, evidently sometimes more seeded.

The Dorsetshire plant will have to be referred to a var. *ceratophyllon*—PLANTAGO CORONOPUS var. CERATOPHYLLON Rapin, Esquisse de l'Histoire Naturelle des Plantaginées, in *Mém. Soc. Linn. Paris*, vi. 482 (1827).

P. coronopifolia Brotero, *Fl. Lusit.* i. 157.

P. ceratophylla Hoffm. & Link, *Fl. Port.* i. 491, t. 74.

Root thicker than in the type, probably perennial. Leaves 6 in. long, sometimes longer, suberect, hairy, oblanceolate in outline, generally 3-nerved, occasionally 5-nerved, apex acute or subacuminate, segments lanceolate, remote, occasionally toothed, acute, or subacuminate.

Scape longer than the leaves, towards the apex rather more hairy than in the type. Heads of flowers 1 in. to 3 or 4 in. or more long. Bracts acuminate, longer than the sepals. Capsule trilocular, generally (as described in the original description) 2-seeded, sometimes more seeded.

Hab. Portugal and South-west Spain.

In Great Britain—Dorsetshire, at Charmouth and near Poole Harbour.

It seems advisable to bring together the other principal named varieties and forms of *P. Coronopus.* The type is a plant with narrow, generally uninerved leaves, toothed or pinnatifid, with usually ascending scapes, equalling or exceeding the leaves; spikes ¼–4 in. long, Capsule 3–4-celled, 3–4-seeded. It is the plant figured in *English Botany*, ed. 3, tab. MDLX., and *Ic. Flor. Dan.* t. 272; judging from the description, it is the *α. vulgaris* of Grenier & Godron, *Flore de France*, ii. 722.

1. PYGMÆA Lange, *Haandbog der Danske Flora* (1853).

A dwarf plant with narrow rachis and narrow segments. Leaves in the specimens before me ½–¾ in. long. Scapes apparently generally ascending, slender, usually only just longer than the leaves. Spikes globose, 2–4- (possibly sometimes more) flowered.

Recorded from Denmark.

In Great Britain, recorded by Mr. W. H. Beeby* from Yell, Shetland. In the Natural History Museum there are specimens from near New Romney, Kent (*F. D. Parker*), and St. David's Head, Pembrokeshire (*H. N. Ridley*), which must be referred to this variety. In the Kew Herbarium there is a specimen from Plymouth, probably this variety.

2. CRITHMIFOLIA Willk. & Lange, *Prod. Fl. Hisp.* ii. 359.

Leaves not carnose, bipinnatipartite, hirsute, rachis dilated towards the apex, sub-3-nerved, segments oval, lanceolate, peduncles ascending.

Recorded from South Spain.

3. LATIFOLIA DC. *Fl. France*, iii. 417.

Plantago Columnæ Gouan, *Illust.* 6.

P. Cornuti Jacq. *Misc.* ii. 351; *Ic. Rar.* i. t. 27, non Gouan.

P. Jacquini R. & S. *Syst.* iii. 140.

Leaves not carnose, hirsute, lanceolate or linear-lanceolate, rachis broad, 3-nerved, segments linear-lanceolate, peduncles ascending.

Recorded from South-west Europe and North Africa (Barbary).

There are authentic specimens of *P. Columnæ* Gouan in the Kew Herbarium. The rachis of the leaf is not particularly broad.

4. MARITIMA Gren. & Godr. *Fl. France*, ii. 722.

Leaves carnose, smooth or ciliate, linear-lanceolate, pinnatifid, rachis broad, 3-nerved, segments linear, peduncles erect.

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* Mr. Beeby also gathered on sea-cliffs, Ollaberry, in Shetland, an interesting plant which looks like very luxuriant *pygmæa*.

Recorded from France, South Spain, Berlengas. [Since Mr. Baker's paper was published, Mr. Arthur Bennett has sent this to the British Museum Herbarium from the Island of Tiree, Hebrides, collected by Mr. Symers MacVicar in 1896.]

5. INTEGRATA Gren. & Godr. *l. c.*

P. Coronopus var. *simplex* Dcne.

Leaves carnose, linear, acuminate, subentire, scarcely dentate, ciliate or smooth, rachis sub-3-nerved, peduncles slender, erect.

Recorded from Sweden, France, Spain, Mediterranean Region, reaches South Persia, Canary Islands.

Sir J. E. Smith, in the *English Flora*, places as var. *β.* of *P. Coronopus*, Plantago gráminea folio hirsuto, minor, capitula rotundo brevi, Dill. in Raii *Syn.* ed. 3, 316. This may approach the above variety.

6. CUPANI Dcne. in DC. *Prod.* xiii. 1, 732.

P. Cupani Guss. *Fl. Sic.* 190; *Ic. Fl. Sic.* t. 70, fig. 1.

Leaves rosulate, with narrow rachis and narrow segments, spikes oblong, bracts ovate, rotund, acute, shorter than the calyx.

Hab. Mountain pastures.

Recorded from Sicily and Morocco.

This is very different from type *P. Coronopus* L., especially if the plants generally referred here from the Atlas Mountains are correctly so placed. The root is stout and probably perennial.

Dr. Wirtgen, in his 8th Fascicle of Critical Rhenish Plants, distributes a form of *P. Coronopus*, which he calls forma bipinnatifida, the leaves being pinnatifid, with narrow rachis and segments. There is a plant in the Kew Herbarium from the cliffs near Freshwater Bay which closely approaches this latter form.

NOTES ON BRITISH PLANTS.

BY ARTHUR BENNETT, F.L.S.

(Concluded from p. 252.)

C. CÆSPITOSA L. *Sp. Pl.* ed. 1, 2, 978 (1753).* *C. pacifica* Drejer, *Fl. Hafn.* 292 (1838). *C. Drejeri* O. F. Lang in *Flora*, 548 (1843). Richter gives nine other names under which this appears in European Floras. He calls it "endemic"; the American plants, according to Bailey, are erroneously referred here. The plant formerly so called, from Greenland, may have been *C. Drejeriana* Lange, *Fl. Dan.* t. 2975. The name of the 1st ed. of the *Species Plantarum* is perhaps not quite free from ambiguity; still from Fries to the present time it is well understood to mean a tufted plant, strict in habit, with many leafless sheaths at the base, regularly arranged fruiting spikes (much like *C. Hudsonii* on a small scale), glumes broad, generally shorter than the fruit, fruit with minute impressions all over, without nerves, or nearly so.

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* See the *Naturalist*, 1895, 271.

Mr. Beeby gathered in Shetland specimens that were referred to *cæspitosa* by Dr. Lange, but as Mr. Beeby did not feel quite satisfied, and as the material was scanty, it was thought best to leave it out of the *London Catalogue*. In 1884 Mr. Percival sent me from Wensleydale, Yorkshire, a number of Carices, among them good specimens of a *Carex* that I sorted with *C. Goodenowii*. Here they lay until I had occasion to compare an odd Hebridean specimen, when on turning over the sheet I at once saw they were *cæspitosa*. It must be remembered that our Floras formerly had a "*C. cæspitosa*"; this was either *stricta* Good. or *Goodenowii* Gay. The *cæspitosa* at Kew marked by Goodenough "my *cæspitosa*" are *Goodenowii* Gay = *vulgaris* Fr.; curiously enough, on the sheet is one spike of *C. flacca*.

C. Goodenowii Gay in *Ann. Sc. Nat.* ser. 2, xi. 191 (1839). *C. vulgaris* Fries, *Nov. Fl. Suec. Mant.* 3, 153 (1842). *β. melæna* (Wimm.). *C. melæna* Wimmer in *Flora*, 1850, 619. This was introduced into the *London Catalogue* on faith of specimens named by Dr. Christ from Perthshire for Dr. B. White. It has (in the Scotch plant) a slender stem, very dark short-spiked female spikes, and a slender male spike.

I possess a curious form of *Goodenowii** from sands near the sea on the Ayrshire coast, gathered in 1896 by Mr. A. Somerville; it is exactly analogous to var. "*γ. bulbosa* Drej. *Symb. Caric.* t. 17, 20 (1844) = *C. bulbosa* Vahl herb.," as that is of *C. flacca* Schreb. Hjelt mentions a form of *Goodenowii* as analogous to *C. acuta personata* Fr. from Tavastland, in Finland. I have somewhat similar ones from Anglesea (*J. E. Griffith*) and Argyll (*E. S. Marshall*).

C. flacca Schreb. *Spic. Fl. Lips.* app. 150 (1771). The following forms occur in Britain:—

β. erythrostachys Hoppe (under *glauca*) in *Linnæa*, xiii. 63 (1839).

? *δ. erecta* Heuff. *l. c.* xxxi. 63 (1863). Wet rocks near Foynes, Co. Limerick (*S. A. Stewart*).

γ. acuminata Anders. *Cyp. Scand.* 31 (1849).

= *C. acuminata* Willd. *Sp.* 4, 300 (1805). Outer Hebrides (*W. S. Duncan*). Richter calls this "*serrulata* Biv. *Stirp. Rar.* 4, 9 (1806)."

Heuffler describes a var. *alpina*, but I have seen no specimens that could be referred to this plant from Britain; our plant does not seem to ascend higher than 2100 ft. I believe that Mr. Druce first used the name *C. flacca* var. *stictocarpa* in *Journ. Bot.* 1888, 368, so that my name as attached to it must be expunged.

C. magellanica Lam. *Encycl.* iii. 385 (1789). *C. irrigua* Smith in Hoppe's *Caric.* 72 (1828).

C. pelia O. F. Lang in *Linnæa*, xxiv. 575 (1851). *C. Langii* (M. N. Blytt) Steud. *Syn. Pl. Cyp.* ii. 227 (1855). *C. panicea* var.

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* This may be f. *macrolepis* Norman, *Fl. Arct. Norveg.* 49 (1893), but I have not seen a specimen of Norman's plant.

β. sublivida Anders. *Cyp. Scand.* 33 (1849), *teste* Hartmann.* *C. panicea* L. *β. pelia* Richter, *Pl. Europ.* 159 (1890). Caithness, July, 1887, *F. J. Hanbury.* This agrees exactly with a specimen sent me by Prof. Blytt from "Norvegia: Christiania (e loco classico Langnosu"; gathered by his father, Prof. M. N. Blytt. The original specimens on which this was founded were gathered by M. N. Blytt. Lang remarks, "Ab habitu *Caricis vaginatæ*, colore livido-glauco totius plantæ longe differt." British specimens named *C. pelia* by Dr. Christ seem to me doubtful; of others I so named from Morven, Caithness, Sir J. D. Hooker wrote me, "I would rather call this *vaginata*," and I agree, after seeing the true plant. Lang gives no synonyms. The Caithness specimen is the only British example I feel quite sure of as to the name, although specimens from Sutherland seem closely allied to it.

C. PANICEA L., var. *tumidula* Laest. *Loc. Parall. Pl.* 283 (1839). I have specimens from Glen Carron, W. Ross, gathered by Mr. Sewell, which I believe are to be referred here; the fruits are subrotund, and the nut large and violet-coloured. This is not caused by being ergotized, as so many fruits are of *panicea*, I think more so than any other British *Carex*.

C. PILULIFERA L., *β. longibracteata* Lange, *Dansk. Fl.* 694 (1864). *C. pilulifera* var. *Leesii* Ridley in *Journ. Bot.* 1881, 97, t. 218. *C. saxumbra* Lees in *Science Gossip*, 1880, 278. Dr. Lange having said that his plant is the same as Dr. Lees's, it must bear his name.

C. VERNA Chaix. In *Lond. Cat.* ed. 8, a var. *capitata* Ar. Benn. was introduced; it was excluded from the 9th as it seemed only a monstrosity; it was gathered in the Mourne Mountains, Ireland, and had much the habit of *C. capitata* L.

C. VAGINATA Tausch. in *Flora*, iv. 557 (1821). The form called *β. sparsiflora* by Hartmann, *Sk. Fl.* ed. 4, 305 (1843), and Lang in *Linnæa*, xxiv. 576 (1851), occurs in several places in Scotland, but it seems scarcely more than a state of *vaginata*. A similar sparse-flowered and attenuated form occurs in *panicea:* I have it from Holyhead (*J. E. Griffith*).

C. PANICEA L., b. *intermedia* (Miég.). *C. intermedia* Miég. in *Bull. Soc. Bot. Fr.* x. 83 (1863). This comes somewhat between *C. panicea* and *C. vaginata*, though nearer the former; it occurred in Scotland, near Fort William (*Rev. E. S. Marshall*). Nyman most unaccountably makes it a var. of *C. vulgaris* Fr., and Richter follows him; but there is no doubt about it being a *panicea* form; there are authentic specimens at Kew. Dr. Lange named a specimen sent him "*C. vaginata* Tausch.?"

C. ATROFUSCA Schkr. *Car.* 1, 106 (1801). *C. ustulata* Wahlb. *Act. Holm.* 156 (1803).

C. CAPILLARIS L., var. *major*. Mr. Ewing gathered *C. capillaris* var. *major* (*Fl. Dan.* t. 2374, f. 3; Blytt, *Norges Flora*, 244 (1861)) in Glen Shee, 12–16 in. high. Blytt says "a foot high." In *Trans.*

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* But Norrlin has "*C. sublivida* mihi = *C. panicea sublivida* Hartm."

Glasg. Nat. Hist. Soc. 110 (1888), Mr. Ewing records this as "var. *alpestris* Anders.," which is a very small plant compared with the usual state.

C. DEPAUPERATA Good. ex With. *Arr.* ed. 2, 1049 (1787). *C. ventricosa* Curt. *Fl. Lond.* f. vi. t. 68 (1790). See *Journ. Bot.* 1896, 185, 229.

C. LÆVIGATA Smith in *Trans. Linn. Soc.* v. 272 (1800). Var. *gracilis* Ar. Benn. in *Journ. Bot.* 1889, 314. This has much the aspect of *C. punctata* Gaud. (*C. diluta* Bieb.), gathered by Mr. Beckwith in Salop. Richter gives "*C. helodes* Link in Schrader's *Journal*, 305 (1799)." Kunth accepts Link's name, and adds to it "*fide* Smith."

C. BINERVIS Smith in *Trans. Linn. Soc.* v. 268 (1800). This varies greatly; Mr. Druce proposes the name f. *nigrescens* for the mountain form in *Journ. Bot.* 1890, 44, but I think Drejer has named this β. *alpina* (*Rev. Crit. Car.* 474 (1841)).

C. DILUTA Bieb. *Fl. Taur.-Cauc.* ii. 388 (1808). *C. punctata* Gaud. *Agrost. Helv.* ii. 152 (1811). Richter gives "*C. pallidior* Degl. in Lois. *Fl. Gall.* ii. 299 (1807)." Mr. Druce (*Ann. Scott. Nat. Hist.* 1896, 40) has a like quotation, but the name is not to be found in the 1807 ed.; it occurs in the 2nd ed. published in 1828—a date which at once disposes of the claim to priority contended for by Mr. Druce. It should be noted that in some herbaria *C. diluta* is represented by *C. distans* L.

C. FLAVA L. (see *Journ. Bot.* 1889, 330). β. *elatior* Schlecht. *Fl. Berol.* 1, 477 (1823). This, according to Prof. Bailey, is *C. lepidocarpa* Tausch. *C. Œderi* Retz; should this bear the name of Ehrhart. Calam. Exsicc. No. 79, 1790?; as Retz declares that his plant is not the plant of Ehrhart. This about equals the var. *minor* Townsend, and is not the *Œderi* of *Eng. Bot.* ed. 3, which is var. *cyperoides* Marsson *Fl. Neuvorp.* 537 (1869) (as a species). *C. chrysites* Link in Herb. Berolin. *teste* Bailey, being a MS. name, should not be used or quoted.

C. FLAVA × FULVA = *C. xanthocarpa* Degl. in Loisel. *Gall.* ii. 299 (1828).

C. ACUTIFORMIS Ehrh. *Beitr. Bot.* iv. 43 (1789). *C. paludosa* Good. in *Trans. Linn. Soc.* ii. 202 (1794). The variety not in *Lond. Cat.* ed. 9. It is a little uncertain what name the variety should bear; it is *C. spadicea* Roth, *Tent. Fl. Germ.* ii. 461 (1793). *C. Kochiana* DC. *Cat. Hort. Monosp.* 89 (1813). *C. paludosa* β. *Kochiana* Gaud. *Fl. Helv.* iv. 130 (1830). *C. paludosa* β. *subulata* Döll. *Rhein. Flora* 144 (1843). I am not sure whether *C. paludosa* var. *elongata* Schum. *En. Pl. Saell.* i. 274 (1801) is the same.

C. RIPARIA Curt. *Fl. Lond.* 4, t. 60 (1821). Richter has *C. crassa* Ehrh. *Beit.* 4, 43 (1789). *C. rufa* Lam. *Encycl.* 3, 394 (1789), and Kunth also quotes these names. I have a specimen from Rostherne Mere, Cheshire, *H. Searle*, 1883, that is very near, if not identical with, *C. riparia* var. *obesa* Fries, *Summ. Veg. Scand.* 70 (1846) (nomen); *C. riparia* var. *deformis* Beurling, *Bot. Not.* 37 (1853)

= *C. nutans* Fr. (non Host) *Nov. Mant.* 1, 19 (1832). It has much the look of the true *C. nutans* Host.

C. ROSTRATA Stokes in With. *Arr.* ed. 2, ii. 1059 (1776). *C. ampullacea* Good. in *Trans. Linn. Soc.* ii. 207 (1794). "*β. elatior* (Blytt)." The brackets are required because Blytt described his plant under *C. ampullacea* in *Norges Flora*, 254 (1861). This is a very tall (3–5 ft.) var. with very long spikes, most of the female ones with male flowers at the apex, broad leaves, flatter than in the type. It is probably the same as *C. ampullacea β. robusta* Sonder, *Fl. Hamb.* 505 (1851).

C. INVOLUTA (Bab.). *C. vesicaria* L., *β. ? involuta* Bab. *Man. Brit. Bot.* ed. 2, 370 (1847). *C. ampullacea* var. *involuta* Baker & Hunt in *Rep. Bot. Ex. Club* for 1863, 9 (1864). *C. involuta* Syme, *Eng. Bot.* ed. 3, x. 168 (1870).

C. VESICARIA L., *β. dichroa* Fr. Mr. Bailey considers (and Lange agrees) that *C. vesicaria dichroa* Anders. *Cyp. Scand.* 18 (1849) is a form of *rostrata;* it certainly in its reduced spikes shows an approach to *C. rotundata* Wahlb.; it must be called *C. rostrata* var. *dichroa* Bailey, *Stud. of Carex*, 39 (1889), in *Mem. Torrey Bot. Club*, No. 1.

C. VESICARIA × ROSTRATA. × *C. Pannewitziana* Figert ex Nyman. Wood at Inny, Co. Longford, Ireland, 10/7/83, *S. A. Stewart.* Perthshire, *Dr. B. White;* sent me lately by Mr. Barckley. These agree exactly with specimens named as this hybrid, and gathered near Bremen by Prof. Haussknecht. I have many specimens doubtfully so named by many collectors, but the above plants accord in every point. Mr. Stewart's specimen has much the appearance of *C. riparia* * *gracilescens* C. Hartm. = *C. riparia* × *vesicaria* Siegert, with the exception of the male spikes.

C. PULLA Good. *Trans. Linn. Soc.* 3, t. 14, 78 (1797). Var. *Grahami* Hook. & Arnott, *Brit. Fl.* ed. 8, 510 (1860). = *C. Grahami* Boott in *Trans. Linn. Soc.* xix. 215 (1843).

In addition to the Floras of Britain, the following may be consulted as throwing some light on our Carices:—

"On some British Carices." McLaren in *Botanical Gazette*, iii. 17–27 (1851).

Priestley on *Carex*, in *Trans. Bot. Soc. Edinb.* iv. 71 (1853).

For full synonymy of our species see Richter, *Plantæ Europeæ*, 145–171 (1890).

A list of European Carices will be found in this Journal for 1885, pp. 260–266.

It is greatly to be regretted that Dr. Boott's splendid work on the Carices has never been completed; unpublished material exists for it at Kew.

In *Vet. Ak. Handl.* 141 (1803) (*Act. Holm.*) Wahlenberg describes a *Carex simpliciuscula* from "Westmorland, Anglia." Sprengel put this to *Kobresia caricina* Willd., and Kunth quoted Sprengel; by the kindness of Dr. Almquist I am able to say this is correct, as he has examined the specimen for me in the Herb. Vet. Ak. Stockholm.

In conclusion I would say, if any British botanist goes to Kew to study *Carex*, let him go to Dr. Boott's cabinets; the specimens are alphabetically arranged, and, with Watson's and Borrer's herbaria, will answer all general queries. I have to thank the staff of the British Museum and Kew Herbaria for ever-ready help in any difficulties.

WELWITSCH'S AFRICAN FRESHWATER ALGÆ.

By W. West, F.L.S., and G. S. West, A.R.C.S.

(Plates 365–370.)

(Continued from p. 243.)

3. Nostochopsis Wood (1869).

1. N. lobatus Wood in *Proc. Amer. Phil. Soc. Philadelphia*, 127 (1869); in *Smithson. Contrib. Knowl.* (1874), iii. 45, t. iii. f. 6; Born. & Flah. *l.c.* 80 (1887). Crass. fil. 2–6 μ; diam. heterocyst. 5·5–7 μ.

Golungo Alto. Ad rupes inundatis in rivulo Muria pr. Muria sparsius; Sept. 1854. No. 201.

The examples of this are very fine ones, and agree well with the figure given by Wille (in *Bihang t. K. Sv. Vet.-Akad. Handl.* Bd. 8, no. 18, t. i. f. 1–19), with the exception of the cell-walls; portions only were as moniliform as the previously-found African examples. (Cfr. West & G. S. West in *Journ. Bot.* 1896, 381, t. 361, f. 1–2.)

The cell-walls are very thin indeed, not any more appreciable than the cell-walls in the ordinary vegetative cells of a *Nostoc*. The majority of the heterocysts are lateral, globose, and either sessile or stalked (usually supported on one or two cells); sometimes they are intercalary, and then they are always elliptic-oblong.

XVII.—Scytonemaceæ.

1. Scytonema Ag. (1824).

1. S. cincinnatum (Kütz.) Thur. in *Ann. Sci. Nat.* 6e série, Bot. i. 380 (1875); Born. & Flah. *l. c.* 89 (1887). *Calothrix lanata* Kütz. *Algar. Aq. Dulc.* Dec. I. no. 5 (1833).

Var. æthiopicum, var. n. Var. pseudo-ramis filo primario diametro paullo tenuioribus, cellulis in parte mediana pseudo-ramorum quadratis vel diametro longioribus. Crass. fil. prim. 25–30 μ, trich. 17–18 μ; crass. pseudo-ram. 19–21 μ, trich. 9·5–11·5 μ.

Pungo Andongo. Alga nigrescens, lubrica, tenax, rhizomata Xyridearum aliarumque plant. palustrium, in spongiosis crescentium, crassis membranis obducens, matricibus tenaciter adhærens—sicque imprimis loca spongiosa formans. Cum *Dichotriche gypsophila* et *Mougeotia irregulari* in pascuis spongiosis breve graminosis juxta rupes gig. prope Catete; May 1857. No. 111.

2. S. rivulare Borzi in *Nuovo Giornale Bot. Ital.* xi. 373 (1879); Born. & Flah. *l. c.* 91 (1887).

Pungo Andongo. Ad muscos rupestres rivulos crescentes per-repens, in Mimosarum sylvis pr. Pedras de Guinga; Jan. 1857. No. 13.

Stratum golden-brown or violet; branches rather scarce, usually solitary, short, a little narrower than the primary filaments; cells sometimes a little longer than the diameter; sheaths constantly asperulate. Crass. fil. 24–26 μ; crass. trich. 15–18 μ.

This is a most interesting species, having been previously seen only from Italy by its original describer.

3. S. Arcangelii Born. & Flah. *l.c.* 92 (1887). Crass. fil. 19–20 μ; crass. trich. 12–13·5 μ.

Golungo Alto. Ad muscos prope fontem magn. ad Banza de Soba Bango sitam; Sept. 1855. No. 159.

The following may be a larger form of this species:—

Golungo Alto. Filaments forming somewhat irregular penicillate tufts of a brown colour. Crass. fil. 23–25 μ; crass. trich. 14·5–17 μ. The specimens were not in a condition for satisfactory identification.

Ad fontem prope Banga de Bango, socialis cum Anthocero, etc.; Sept. 1855. No. 158.

4. S. Millei Born. in Born. & Thur. *Notes Algolog.* 147 (1880); Born. & Flah. *l.c.* 93 (1887). Crass. fil. 18·5–25 μ; crass. trich. 11–14·5 μ. Heterocysts sometimes subquadrate.

Pungo Andongo. Ad rupes vulc. humectans prope Cacella, inter *Dichotrichem olivaceam*; Febr. 1857. No. 7.

5. S. ambiguum Kütz. *Spec. Algar.* 894 (1849); *Tab. Phyc.* ii. (1850–2), 7, t. 26, f. ii.; Born. & Flah. *l.c.* 100 (1887). Crass. fil. 8–9·5 μ; crass. trich. 2·8–3·5 μ.

Pungo Andongo. Inter *S. Myochrous* var. *chorographicum*; Febr. 1857. No. 6.

The heterocysts are about three times longer than broad, and sometimes as many as three together.

6. S. figuratum Ag. *Syst. Algar.* 38 (1824); Born. & Flah. *l.c.* 101–3 (1887). Crass. fil. 16–20 μ; crass. trich. 6·5–8 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15. In graminosis paludibus juxta rivulum de Lopollo; April 1860. No. 180.

7. S. Myochrous (Dillw.) Ag. *Dispos. Algar. Suec.* 38 (1812); Born. & Flah. *l.c.* 104–6 (1887). *Conferva Myochrous* Dillw. *Brit. Conferv.* 37, t. 19 (1802).

Var. chorographicum, var. n. Var. vaginis non ocreatis. Crass. fil. prim. 28–31 μ; crass. ram. 21–25·5 μ; crass. trich. 7·5–11 μ.

Pungo Andongo. Freq. et temp. pluv. (Dec. usque Apr.) læte vegetans, in summis rupibus; Febr. 1857. No. 6. Alga erecta vel decumbens, cæspitose crescens, filamentis oculo nudo nigris, penicillatim e centro adh. radiantibus, mox latas rupium gigant. plagas, imprimis verticales, colore atro tingens, qua ex causa = *Pedra negras* de Pungo Andongo.

Etiam ad latera boreal. et occid. de Pedra Songue; Apr. 1857. No. 12. Alga terrestris vel potius rupestris, eximie gregaria, incrementi rapidissimi, juventute et tempore per dies nebuloso, atrovirens solis luce et nidore cito nigrescens, latissimis rupium plagas perpendiculares colore aterrimo tingens.

This agrees in every particular with *S. Myochrous*, with the exception that the filaments are never ocreate. From *S. figuratum* it differs in being of larger dimensions, and in having a relatively thicker sheath.

8. **S. insigne,** sp. n. S. rupestris, spongiose cæspitosum, pulvinulis elasticis, 4–6·5 mm. altis, violaceo-viridibus vel violaceo-fuscescentibus; filis crassis, in fasciculis arcte adhærentibus; pseudoramis solitariis vel raro geminatis, longis et flexuosis, filo primario paullo angustioribus, apicibus subattenuatis; vaginis crassis, achrois, lamellosis, marginibus rectis vel irregularibus non ocreatis, sæpe confluentibus; trichomatibus pallide ærugineis, cellulis distinctissimis, quadratis vel diametro 1½-plo longioribus, nonnunquam diametro duplo brevioribus et leviter torulosis, sæpe cylindricis et diametro 3–4-plo longioribus; heterocystis quadratis; hormogoniis brevibus, cellulis quadratis interdum diametro brevioribus, lamellis interioribus vaginæ luteis vel aureis. Crass. fil. prim. 25–29 μ (usque 33 μ); crass. ram. 16–19 μ; crass. trich. 7·5–13·5 μ; long. hormogon. 100–170 μ, lat. 15–19 μ.

Golungo Alto. Ad rupes madidas in umbrosis juxta rivum Coango inter Sange et Undelle, nunc violaceo-viridis, nunc intensius violacea; May 1856. No. 5. Etiam ad rupes rivul. Coango humect. pulvinula livido-cinerea spongiosa formans; June 1856. No. 140.

This plant is noticeable for the variability of its filaments, some having parallel margins with long cells, others having firm irregular margins with somewhat torulose trichomes, consisting of very short transversely elliptic cells of irregular size. The latter filaments much resemble the branches of a *Stigonema*. The sheaths of this plant are altogether remarkable, being quite colourless, and often very irregular in the margin; wherever they come in contact with each other they appear to coalesce, and this coalescence gives rise to a phenomenon (*viz.* the apparent inclusion of two parallel trichomes in the same sheath) which, so far as we are aware, has not been previously noticed in this genus. The branches are also most peculiar, the majority being solitary, and given off laterally from one cell of the primary filament precisely as in *Hapalosiphon*. Taking into consideration all these points, there are still unmistakable characters which place the plant in the genus *Scytonema*.

2. Tolypothrix Kütz. (1843).

After examining the three following species, we cannot agree with Bornet and Flahault in separating the genera *Hassallia* and *Tolypothrix*. The former is said to be distinguished from the latter by its fragile filaments and its terrestrial habit. The three species referred to are all terrestrial as described for *Hassallia*, but the sheaths (especially that of *T. crassa*) are very firm, persistent, and flexile, agreeing with those of *Tolypothrix*. Under which genus ought these species to be placed? The terrestrial habit points to *Hassallia*, the flexile and non-fragile filaments to *Tolypothrix*. It appears to us that the only character left to separate the two sup-

posed genera is the fragility of the sheaths, which in itself is certainly an insufficient generic distinction.

1. **T. crassa**, sp. n. T. terrestris, strato crasso spongioso nigricante vel atro-viride; filis crassis flexuosis, dense intertextis; pseudo-ramis paucis, remotis, brevibus et suberectis; vaginis crassis, firmissimis, valde lamellosis (lamellis inæqualibus in crassitudine), non ocrearis, sordido-luteis; trichomatibus ærugineis, cellulis subquadratis vel diametro duplo longioribus; heterocystis solitariis, quadrato-oblongis vel subquadratis. Crass. fil. 25–27 μ; crass. trich. 11·5–14·5 μ.

Pungo Andongo. Ad dextr. flum. Cuanza locis palustribus inter Lythraceas, etc. prope Candumba; March 1857. No. 11.

2. **T. phyllophila**, sp. n. T. strato dense intricato, olivaceo-viridis vel nigro-viridis; filis circiter 1 mm. altis, irregulariter pseudo-ramis; pseudo-ramis brevibus, filo primario subparallelis; vaginis crassis, achrois, firmis et persistentibus, non ocreatis; trichomatibus subparallelis, olivaceo-viridibus; cellulis diametro 1–1½-plo longioribus, nonnunquam diametro brevioribus (plerumque in ramis parvis et ad apices filorum primariorum est); heterocystis solitariis, ad basin pseudo-ramorum vel inter eos, subquadratis, oblongis vel subhemisphæricis. Crass. fil. 12·5–18 μ; crass. trich. 8·5–10 μ; long. heterocyst. 8·5–13 μ.

Golungo Alto. Ad folia viva *Rinoreæ* (*Alsodeiæ*) spec. e Violacearum familia, in sylvis densis de Alto Queta; Dec. 1855.

The nearest species to this is *T. byssoidea* (Hass. *Brit. Freshw. Alg.* i. 233–4; ii. t. lxvii. f. 5), from which it differs in its much thicker colourless sheath, which is not fragile, and in the usually longer cells.

3. **T. arenophila**, sp. n. T. terrestris, strato compacto tenue submembranaceo fulvo; filis brevibus, dense intricatis, flexuoso-contortis et apicem versus attenuatis; pseudo-ramis rarissimis brevibus et subappressis; vaginis crassis, firmis et lamellosis, flavis vel flavo-brunneis, marginibus glabris, non ocreatis; trichomatibus ærugineis; cellulis diametro 1¼–2¼-plo longioribus, protoplasmate granuloso; heterocystis solitariis, rectangulari-oblongis, diametro circiter 1½-plo longioribus. Crass. fil. 14·5–15 μ; crass. trich. 5·5 μ.

Pungo Andongo. Ad terram arenoso-humosam in editissimis rupibus Pedra Cazella, cum *Schizotriche delicatissima*; Jan. 1857. No. 151.

4. T. LIMBATA Thur. in Born. & Flah. in *Ann. Sci. Nat.* 7e série, Bot. v. 124 (1887). A smaller form with yellowish brown sheaths, which are often somewhat rough on the exterior. Crass. fil. 9·5–10 μ; crass. trich. 5·5–7 μ.

Mossâmedes. Cum *Oscillatoria tenui* in umbrosis muscosis ad ripam fluminis Bero prope Cavalheiros; Aug. 1859. No. 191.

XVIII.—NOSTOCEÆ.

1. NOSTOC Vauch. (1803).

1. **N. repandum**, sp. n. Thallis irregulariter expansis et laciniatis, circiter 15 cm. latis, bullato-gyrosis, fere coriaceo-

tenacibus, olivaceo-viridibus; filis dense intricatis et flexuosis, vaginis non visis; trichomatibus angustissimis, pallide æruginosis, cellulis ellipticis vel doliformibus, diametro circiter 1½-plo longioribus; heterocystis globosis, circiter diametro trichomatis duplo latioribus; sporis subglobosis, leviter angulosis, episporio glabro et achroo. Crass. trich. 2·5 μ; diam. heterocyst. 4·5 μ; diam. spor. 7·5–9·5 μ.

Pungo Andongo. Freq. ad rupes editiores vulcan. prope Cabondo tempore pluvio, intra dies duas tresve ingente copia obvia; Febr. 1857. No. 21.

The nearest species to this is *N. humifusum* Carm., from which it is distinguished by its very large coriaceous non-tuberculate thallus, by its constantly elliptical or doliform cells, and by its larger heterocysts and spores.

2. **N. paradoxum** Welw. MS. Thallis vix 1½ mm. latis, gregariis vel solitariis, olivaceo-viridibus et nigrescentibus, peridermide tenue et hyalino; filis densissime intricatis, flexuosis et abrupte contortis; trichomatibus uniformibus, æruginosis, cellulis cylindricis, quadratis vel diametro 1⅓–1½-plo longioribus; heterocystis solitariis (raro binis), oblongo-ellipticis et submagnis. Crass. trich. 3·5–3·8 μ; long. heterocyst. 8·5–9·5 μ, lat. 6·5–7·5 μ.

Pungo Andongo. Ad mucos dense cæspitosos juxta rivulos prope Pedra Songue; April 1857. No. 20.

This species belongs to that division of the section *Humifusa* with cylindrical cells.

3. N. MUSCORUM Ag. *Dispos. Algar. Suec.* 44 (1812); Kütz. *Tab. Phyc.* ii. (1850–2), 2, t. 5, f. iv; Born. & Flah. *l.c.* vii. 200–1 (1888). Crass. trich. 3·5–3·6 μ; diam. heterocyst. 6 μ.

Pungo Andongo. Ad rupes schist. pr. Candumba; Jan. 1857. No. 22. Cambondo; Febr. 1857. No. 285.

4. N. MINUTUM Desmaz. *Plantes Cryptog. du Nord de la France*, fasc. xi. no. 501 (1831); Born. & Flah. *l.c.* 209 (1888). This is not identified with certainty, as it was seen in very small quantity; spores elliptical, concatenate, long. 5–5·5 μ, lat. 3·5–4·5 μ; crass. trich. 2·5 μ.

Mossâmedes. Inter *Œdogonium* sp. in stagnis puris ad ripas flum. Bero; Aug. 1859. No. 190.

2. ANABÆNA Bory (1822).

1. ANABÆNA sp.

Golungo Alto. Specimens very fragmentary, and spores not attached to the trichomes. Crass. trich. 3–3·5 μ; diam. heterocyst. 5·5–6·5 μ; long. spor. 23 μ, lat. 9·5 μ.

Freq. sed cito marcescens ad latera rivuli Coango; Aug. 1857. No. 163.

XIX.—CAMPTOTRICHEÆ.

Ordo novus Hormogonearum Homocystearum; fila brevia, vaginata, irregulariter flexuosa, extremitates versus attenuata, serie irregulari singula cellularum intra vaginam unamquamque, *cellulis haud uniformibus*, vaginis delicatis et achrois.

1. **Camptothrix,** gen. n.

Plantæ minutæ, filamentosæ et epiphyticæ; fila brevissima, haud ramosa, e serie singula cellularum irregularum formata, supra algas majores aquaticas repentia, irregulariter flexuosa et submoniliformia, vaginata; vagina delicata, arcta et hyalina; cellulæ subglobosæ, rotundo-quadratæ vel subrectangulares, apicem versus filorum minores, prope apicem filorum vaginis indistinctis vel destitutis; protoplasma pallide ærugineum et homogeneum.

1. **C. repens,** sp. unica. Character idem ac generis. Crass. fil. 3·8–5·8 μ.

Huilla. Epiphytica supra *Schizotrichem natantem* et *Microcoleum sociatum*, in uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15.

The diverse forms of the cells and their irregular disposition in the short tapering filaments give a character to this genus not possessed by any other of the genera of either the *Vaginarieæ* or the *Lyngbyeæ*, and necessitate the plant being placed as the type of a new order (*Camptotricheæ*) of *Hormogoneæ Homocysteæ*.

XX.—VAGINARIEÆ.

1. SCHIZOTHRIX Kütz. (1843).

1. **S. elongata,** sp. n. S. libere natans, calce non incrustata et non in strato distincto; filis angustissimis et longitudine maximi, flexuosis et ad intervalla longa bifurcatis; vaginis firmis subarctis, cylindricis, hyalinis et achrois, marginibus parallelis et leviter asperis, valde attenuatis ad apicem longum criniformem; trichomatibus læte æruginosis, 1–3 intra vaginam, parallelis vel subtorulosis, ad dissepimenta non constrictis; cellulis diametro 4–8-plo longioribus, dissepimentis plerumque indistinctis; parte apicali trichomatis attenuata. Crass. fil. 7·5–13 μ; crass. trich. 1·2–1·5 μ.

Huilla. Inter *Hapalosiphonem luteolum* et *Microsporam Löfgrenii*, &c., in uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

This differs from the other allied species in several noteworthy features, such as the extremely long flexuose attenuate filaments with few branches, the long cells, and the somewhat close cylindrical sheath.

2. **S. delicatissima,** sp. n. S. terrestris; filis minutis, brevissimis, tortuosis et interdum ramosis; vaginis subamplis et firmis, marginibus glabris vel irregulariter undulatis, hyalinis, subhomogeneis, apicibus subobtusis vel sæpius longissime attenuatis; trichomatibus læte æruginеis, 1–2 intra vaginam, parallelis vel leviter torulosis, ad dissepimenta constrictis; cellulis diametro 6–8-plo longioribus, protoplasmate homogeneo; cellula apicali acute conica. Long. tot. fil. 100–400 μ; crass. fil. 5–6·5 μ; crass. trich. 0·6–0·8 μ.

Pungo Andongo. Cum *Tolypotriche arenophila*, ad terram arenoso-humosam in editissimis rupibus Pedra Cazella; Jan. 1857. No. 151.

This species is very easily overlooked on account of its minute size and delicacy.

3. S. FRIESII (Ag.) Gomont in *Ann. Sci. Nat.* 7e série, Bot. xv. 316–8, t. 9, f. 1, 2 (1892). *Oscillatoria Friesii* Ag. *Synops. Algar. Scand.* 107 (1817). Crass. fil. 9–10 μ; crass. trich. 4·5–5·3 μ.

Huilla. Alga gelatinosa, badio-fusca, folia Xyridearum in editis de Morro de Lopollo obducens; Febr. 1860. No. 192.

4. S. THELEPHOROIDES (Mont.) Gomont, *l.c.* 319, 320, t. 10, f. 1–4 (1892). *Scytonema? thelephoroides* Montagne, *l.c.* 2e sér. Bot. xii. 45 (1839). Crass. fil. 38–48 μ; crass. fil. 6 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176. A few small examples of this species occurred in this gathering; we should like to have seen more of it, as it appears to be an aquatic form of the species.

5. S. FUSCESCENS Kütz. *Phyc. Gener.* 230 (1843); Gomont, *l.c.* 324–5, t. 11, f. 4–6 (1892). Crass. fil. 12–32 μ; crass. trich. 1·5–3 μ.

Huilla. Freq. apud *Hapalosiphonem aureum*, in paludibus exsiccandis; April 1860. No. 176. Etiam in graminosis paludosis juxta rivulum de Lopollo; April 1860. No. 180.

Var. AFRICANA, var. n. Var. filis brevioribus; trichomatibus 2–3 intra vaginam, cellulis diametro 1½–2-plo longioribus. Crass. fil. 15–20 μ; crass. trich. 2·5 μ.

Huilla. Terrestris, cum *Porphyrosiphone Notarisii*, in pascuis pluv. autumnalibus frequentius inundatis, demum exsiccantibus ad lacum magnum de Ivantala; March 1860. No. 18.

6. **S. natans**, sp. n. S. inter alias algas aquaticas reperta, plus minusve solitaria vel in cæspitibus minutissimis intricatis; filis elongatissimis et in partem superiorem sparsim ramosis; vaginis firmis, crassissimis et lamellosis, marginibus parallelis et irregularibus (nonnunquam subglabris), apicem versus gradatim et gradatim angustatis, apicibus interdum multe attenuatis, lamellis interioribus circa trichomata læte rubris (subsanguineis), lamellis exterioribus achrois vel pallide rubris; trichomatibus ærugineis 1–4 (plerumque circiter 3, raro 5–6) intra vaginem, parallelis vel hinc inde torulosis, elongatis, ad genicula non constrictis, cellulis subquadratis vel diametro duplo longioribus, protoplasmate granuloso; cellula apicali conica. Crass. fil. 49–61 μ (usque 92 μ); crass. trich. 5·8–6·5 μ.

Huilla. Inter *Microsporam Löfgrenii*, &c., in uliginosis editioribus prope Humpata, Empalanca et Lopollo, plagas spongiosas unacum Eriocauloneis, Xyridibus et Utriculariis constituens; May 1860. No. 15. Morro de Lopollo; May 1860. No. 182. Etiam in graminosis paludosis juxta rivulum de Lopollo; April 1860. No. 180.

The nearest species to this is *S. purpurascens* (Kütz.) Gomont, *l. c.* 320–1, t. 9, f. 6–8, from which it is distinguished by the much fewer branches of its more elongate filaments, its differently coloured sheaths which are much more attenuate at the apices (not acuminate), its less numerous and more elongate trichomes not constricted at the dissepiments, and in the cells never being shorter than the diameter, as well as in its subsolitary free-swimming habit.

2. Porpyrosiphon Kütz. (1850–52).

1. P. Notarisii Kütz. *Tab. Phyc.* ii. (1850–2), 7, t. 27, f. i. Crass. fil. 21–29 μ; crass. trich. 12·5–17 μ. This interesting and characteristic alga appears to have been abundant in the district traversed by Welwitsch.

Pungo Andongo. Alga terrestris, latissimas palustrium terrarum plagas colore sanguineo-ferruginea tingens, prope Condo; March 1857. No. 9. Alga cæspitosa, glauco-viridis. inter muscorum cæspites in cryptis editiorum montis de Cazella crescens; Dec. 1856. No. 107. (These specimens appear to be old ones; many of the sheaths were empty, and the red colour has mostly disappeared.)

Huilla. In udis sylvaticis et apricis inter Monino et lac. Ivantala latas plagas colore fusco-sanguineo obducens; April 1860. No. 14. Frequens in pascuis pluv. autumnalibus frequentius inundatis, demum exsiccantibus ad lacum magnum de Ivantala; March 1860. Nos. 17 and 18. "Alga terrestris, atro- vel fusco-sanguinea, late cæspitosa, cæspitibus lubricis planis e filamentis tenacibus dense intertextis et contextis versus marginem radiantibus conflatis, terræ arcte adhærentibus; loca ubi frequens obvia hæc Alga, tempore spongiosa facta et multis aliis stirpibus uliginosis solum præbent."

This alga occasionally branches; these branches are few and of the same thickness as the primary filament, around which they are closely coiled. The sheath of the branch becomes solid at the base, and is gradually merged into that of the primary filament, its trichome not being in any way connected with that of the latter. The branching really consists of a close application of the base of one filament to the sheath of another, the fusion being for such a short distance that the two trichomes are never present within the same sheath. It is of the same type as the branching present in *Schizothrix*, but the division into branches is deeper, causing the branches and primary filaments to be of equal thickness. The above remarks prove that *Porphyrosiphon* is very closely related to *Schizothrix*, and emphasizes its position in the *Vaginariæ*. This affinity was inferred by Gomont (in *Ann. Sci. Nat.* 7e série, Bot. xv. 332) from a consideration of an entirely different character, *viz.* the structure of the sheath. Gomont's statement on the same page that *Porphyrosiphon* has no branches is, however, erroneous.

3. **Polychlamydum**, gen. n.

Plantæ aquaticæ; fila subbrevia (4–6 mm.), flexuosissima et sine ramis; vaginæ amplissimæ, e serie tubarum concentricarum constitutæ, tubis interioribus firmissimis et coloratis, iis exterioribus hyalinis et plus minusve diffluentibus, apice aperto et leviter expanso; trichomata solitaria, nonnunquam 2 vel rarius 3 intra vaginam; apice trichomatis recto; cellulæ brevissimæ.

1. **P. insigne**, sp. unica (tab. 365, figs. 1, 2). P. tubis firmis interioribus vaginarum flavo-brunneis 5–7, subarctis, regularibus et in ambitu glabris; tubis exterioribus 2–4, hyalinis, achrois, delicatissimis, iis extimis diffluentibus cum marginibus multe irregu-

laribus; trichomatibus olivaceo-viridibus, ad dissepimenta non constrictis, apice obtuso non capitato; cellulis diametro 9–11-plo brevioribus; protoplasmate granuloso. Crass. tot. fil. 67–105 μ; crass. trich. 17–22 μ.

Loanda. Ad *Nitellam* et *Najadem* in lacu de Quifandongo; Dec. 1853. No. 195.

The peculiar sheaths of this genus readily distinguish it from the other genera of the *Vaginarieæ*, its nearest ally being *Dasyglœa* Thw., from which it differs in the very firm multitubular sheath with an open apex, and in the much thicker trichomes with very much shorter cells. There is a very distinct line of demarcation between the inner and outer constituents of the sheath, the outermost one being rendered conspicuous only by the extraneous material adhering to it. The trichomes are also usually without any interruption for a considerable length.

4. MICROCOLEUS Desmaz. (1823).

1. M. VAGINATUS (Vauch.) Gomont in *Journ. de Botaniq.* iv. 353 (1890); in *Ann. Sci. Nat.* 7e série, Bot. xv. 355–8, t. 14, f. 12 (1892). *Oscillatoria vaginata* Vauch. *Hist. Conferv.* 200–1, t. xv. f. 13 (1803).

Var. MONTICOLA (Kütz.) Gomont in *Ann. Sci. Nat. l. c.* 356 (1892). Crass. fil. 3·5–4·2 μ.

Pungo Andongo. Inter *Porphyrosiphonem Notarisii* et *Lyngbyam ærugino-cæruleam;* March 1857. No. 9.

2. **M. sociatus**, sp. n. M. inter alias algas aquaticas repertus; filis simplicibus, elongatis et flexuosis; vaginis firmis, hyalinis, ad apicem apertis; trichomatibus multis (9–13) intra vaginam, subparallelis vel contortis, ad dissepimenta constrictis, dissepimentis non granulosis; cellulis diametro 2–3 (plerumque 2)-plo longioribus, cylindricis; protoplasmate granuloso; cellula apicali acute conica (diametro circiter 5-plo longiori). Crass. fil. 54–65 μ; crass. trich. 2·7–3 μ.

Huilla. Inter *Schizotrichem natantem* et *Microsporam Löfgrenii*, in uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

This differs from *M. lacustris* (Rabenh.) Farlow in its narrower trichomes with cylindrical cells, its acutely conical apical cells, and in its firmer sheaths.

(To be continued.)

FERDINAND VON MUELLER.

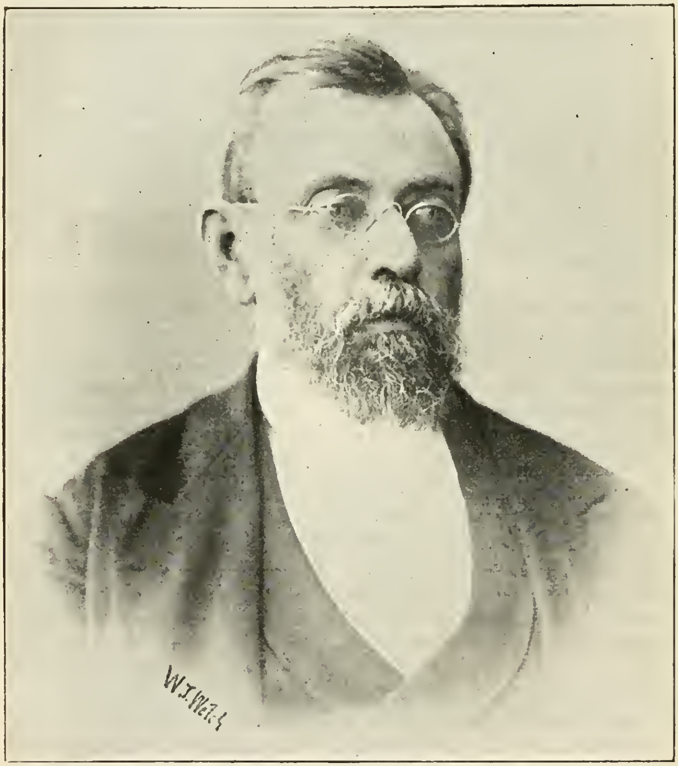
[IT must have surprised some of our readers that no biographical sketch of our valued correspondent Baron Ferdinand von Mueller, who died on the 9th of last October, has appeared in these pages. The reason for the omission is, however, not far to seek. We had hoped to have received from some Australian botanist some account of the late Baron, and in that hope delayed any notice of his life and work. Such account not being forthcoming, we reprint in a slightly abbreviated form the interesting biography by Mr. W. B. Spencer, published in the *Victorian Naturalist* for October last.

A notice in the *Gardeners' Chronicle* of Oct. 17, 1896 (accompanied by a portrait, for the loan of which we are indebted to the Editor of that periodical) gives an interesting sketch of his work, but is somewhat marred by an undue insistence on the harmless egotism which characterized the deceased botanist. That he had a weakness for titles and a high opinion of his own capabilities was manifest enough, not only to his correspondents, but to those acquainted with his work; but the weakness is one to which many excellent folk are subject, and it would have been affectation had he not recognized the great work he did for Australian botany. There are other criticisms in the *Chronicle* to which exception might be taken. That the Baron was capable of great sacrifices on behalf of science is manifest from the following sketch; the generosity with which he supplied Mr. Bentham with the material which he had accumulated for a Flora of Australia is in itself sufficient proof of this—indeed, his willingness to communicate information was only equalled by his anxiety to acquire it.—Ed. Journ. Bot.]

Ferdinand Mueller's father was Commissioner of Customs in the little town of Rostock, and there he was born in 1825, and received his early education, evidently intending from an early age to become a pharmaceutical chemist; in fact, his first employment was as chemist's assistant in the town of Husum, in Schleswig-Holstein. From Rostock he went to study at the University of Kiel, where he passed his pharmaceutical examination in 1846, his early studies in which direction will explain the interest which he has always taken in this department.

Meanwhile, however, he had attended the botany lectures of Professor Nolte, and with characteristic energy had set to work studying and collecting in his spare time the plants of the island of Sylt, and in 1846 he presented, as a thesis for the degree of Doctor of Philosophy in the University of Kiel, a paper on *Capsella Bursa-pastoris*. In the same year he published in *Flora* a more extensive paper on the flora of Schleswig-Holstein, and though he was unable to devote himself as yet entirely to his favourite study, it is evident that his path in life was already clearly marked out for him, and that, wherever he was or whatever occupation he might have to follow, the study of botany would be his main object.

Late in 1846, Dr. Preiss, a friend of the Mueller family, had returned from a visit to Western Australia, and being acquainted with the phthisical tendency of the student and his sisters, had strongly urged their emigration to the more genial climate of the sunny south. Accordingly Dr. Mueller and his sisters set sail, and arrived in Port Adelaide in December, 1847. His capital was limited mainly to his brains, so he had to find something to do, and readily got and accepted employment in the chemist's shop of Heuzenroeder, in Rundle-street. Adelaide was not then what it is now, and one had not to go far afield to get beyond the reach of civilization. All his spare time was spent in studying the new flora with which he found himself surrounded, and in connection with this work he made expeditions to various parts, then, it must be remembered, difficult of access and peopled with not too friendly natives, such as the Murray scrubs, Guichen Bay, and Mount Brown, the highest point of the Flinders Range, gaining in this way his first insight into the Australian flora, which he was subsequently destined to do so much to elucidate.



Having bought some land in the Bugle Ranges, it was apparently at one time his idea to settle down there and cultivate it. Doubtless he intended to have his home in this spot, and to make, when possible, expeditions in various directions. At any rate, he had already devoted a considerable amount of time and energy to collecting plants and noting facts relative to the flora, his earlier papers being written in conjunction with Dr. Sonder, and published in *Linnæa.* The life on the land did not, however, prove at all attractive, and in a very short time we find him back again in Adelaide, once more engaged in his old occupation.

In 1852, at the time of the gold rush, he was attracted to this colony. Evidently his reputation as a botanist had preceded him, for in the same year Governor Latrobe appointed him Government Botanist to the colony of Victoria, and from that time onward he devoted himself with untiring, and one might almost say with phenomenal, energy to the work of the post, which was described as the investigation of the vegetable resources of the colony, though it may be said without any exaggeration whatever that, whilst Victoria had the honour of claiming him as her botanist, the other colonies shared almost equally in the advantages to be derived from his wide knowledge; he was in fact, though not in name, Government Botanist of Australia. Not only was his reputation world-wide, but, what is more remarkable, there was probably no township or hamlet in the whole of Australia, from Cape York to Hobart and from Sydney to Perth, in which the name of Baron von Mueller was not known and respected.

When appointed Government Botanist, Mr. Dallachy was Curator of the Botanic Gardens, Dr. Mueller's duties in connection with them consisting in the scientific naming and arrangement of the plants. Subsequently, in 1857, he became head of the Gardens; but, later on again, these were most wisely placed under the charge of Mr. Guilfoyle, Dr. Mueller being thus left free to undertake the more purely scientific work attaching to the Botanical Department—an arrangement which no one will now deny was most wise and of great advantage both to the Gardens and the Department.

At first Dr. Mueller occupied a small, unpretentious cottage which still overlooks the Yarra below Government House, and the three years succeeding his appointment, 1852–55, were with him times of great activity. In search of plants he explored a large part of Victoria, crossing the Alps, where he gave the name to Mount Hotham. As early as 1853 he had been to the top of Mount Buffalo, and the same year found him starting alone from Melbourne, with three horses, to explore what were then the almost untrodden wilds of Gippsland. The sight of him, as he passed through what was then the countrified suburb of Hawthorn, mounted on his favourite pony, and driving before him his pack-horses laden with his collecting material and slender allowance of food, is still vividly remembered.

The Mallee district and the Grampians were also traversed by him in search of plants to enrich the national Herbarium, which, under his guidance, and due entirely to his zeal, had become by far the richest in the Southern Hemisphere.

In 1855 he went further afield and joined the veteran explorer, A. C. Gregory, in his expedition across the north-west, on which occasion the Victoria River and other parts were explored. He was one of the four who reached Termination Lake in 1856, and after accompanying Gregory on the return journey to Moreton Bay, he came south again to Melbourne, publishing afterwards the main botanical results in the Linnean Society's Journal.

In 1857 he was appointed, as before said, Director of the Botanic Gardens as well as Government Botanist. There now commenced the period of his greatest activity, so far as the publication of works is concerned, and from this date up to the time of his death it may be said that he was always engaged upon some publication dealing with the Australian flora.

One of the earliest of these was the *Plants Indigenous to the Colony of Victoria*, whilst between the years 1858 and 1881 eleven parts of the *Fragmenta Phytographiæ Australiæ* were issued; this work being, we believe, the first published in Latin in Australia. Its object was to contain descriptions of new species of plants and observations of importance on others which came under his notice, the whole being intended as a record leading up to a comprehensive flora of Australia, which it was his long-cherished desire to issue. When the time came, however, for carrying the work into execution, it was apparent that it could only be successfully done by someone who had access to the type specimens in Europe, and this being impossible in the case of Dr. Mueller, the work was published by Bentham, associated with the former. All collections were first examined by him, then sent to London, revised, and finally dealt with by Bentham, the result being the seven classical volumes forming the *Flora Australiensis*, published between 1863 and 1878. We quote the following words from Mr. Bentham's introduction to the "Flora":—"When it was first contemplated to bring out a general Flora of Australia under Government sanction, Dr. Mueller was naturally looked to as the botanist best qualified for undertaking the task of preparing it; and in the hope that it would be entrusted to him he had devoted his utmost energies to collecting the necessary materials. But there was one indispensable step, the examination of European herbaria, where the published types were deposited, which he was unable to take; and it is a signal proof of the generosity of his disposition, and the absence of all selfishness, that when it was proposed to him that the preparation of the Flora should be confided to me, on account of the facilities which my position here gave me for the examination of the Australian collections I have mentioned above, he not only gave up his long-cherished projects in my favour, but promised to do all in his power to assist me—a promise which he has fulfilled with the most perfect faith."

Already the value of his work had been recognized by his election into the Royal Society in 1861, and ten years later he was created a Baron of the Kingdom of Würtemburg. Honours of various kinds began to reward his efforts, but instead of tempting him to rest upon his laurels, they only seemed to spur him on to further work.

In 1879 he commenced the publication of what is perhaps his most important single contribution to our knowledge of the Australian flora—the ten decades of the *Eucalyptographia*, a difficult genus, in which naturally he was deeply interested. Not only did the purely scientific side of the work appeal to him, but here as in other work the economic aspect found in him a zealous investigator. It was mainly through his efforts that attention was drawn to the supposed hygienic properties of the trees; and it was through his instrumentality that the Blue Gum—*Eucalyptus Globulus*—was introduced into the malarious districts of the old world, whilst he was also much associated with Mr. Bosisto in the investigation of the eucalyptus oils.

From the economic aspect, perhaps his most important work—indeed, it would seem to have been one of his most favourite ones—was that on *Select Extra-Tropical Plants*, intended as a guide to plants suitable for industrial cultivation in the colony, and of which between 1871 and 1895 no fewer than eight editions were issued. Of works of economic value may also be mentioned a translation, with original notes, which he caused to be published at his own expense, of Wittstein's *Organic Constituents of Plants*, and also reports by Messrs. Hoffman and Rummel on *Chemical Researches on Vegetable Products of Victoria.*

In 1887–88 he published the *Iconography of Australian Species of Acacia and Cognate Genera*, consisting of 130 plates, with explanatory matter; in 1886 the work on *Myoporineæ* was commenced, with seventy-two plates, and in 1890–91 he published the two volumes on *Salsolaceous Plants*—a work of considerable economic value, and likely to be still more highly valued when Australia is fully alive to the great economic importance of this part of its flora.

In 1885 he commenced to work, at the instigation especially of the late Dr. F. S. Dobson, a former president of this club, on the *Dichotomous Key to the Victorian Flora.* The plan was one which was clearly distasteful to him, and though, as with all his other work, he expended upon it a great amount of conscientious labour, it must be frankly admitted that from the point of view for which it was intended it was not a success; indeed, it may be doubted whether a work on such a plan could be satisfactory beyond a certain and very limited degree. The Baron was pre-eminently an investigator, and not a teacher in the ordinary sense of the word, and with his profound knowledge it is not to be wondered at that he found the dichotomous method almost impossible to utilize in the grouping and identification of species.

Amongst other works may be noticed his papers on the Papuan plants of D'Albertis and Macleay, and, in more recent years, on those collected by Sir Wm. Macgregor in New Guinea, and in the New Hebrides by Mr. Campbell. The works of explorers such as Babbage, M'Douall Stuart, Giles, and J. and A. Forest, and the report of the Elder expedition, contain valuable lists of the flora of various little known parts of the continent.

For years past collectors from all parts of the continent, many subsidized by himself, but many others, fired by his enthusiasm, working gladly to assist him, have supplied him with material, the results of his work being scattered through various publications, more especially those of the Linnean Society of New South Wales, the Victorian, Tasmanian, and South Australian Royal Societies, and the Field Naturalists' Club of Victoria. One of the finds which pleased him most in recent years was that of the only known Australian Rhododendron (*R. Lochæ*), secured by Mr. Sayer on Mount Bellenden-Kerr in Queensland.

His invaluable *Systematic Census of Australian Plants*, the second edition of which was published in 1889, serves to show the extent of his labours, not only in adding to the known flora, but in elucidating the geographical distribution of all Australian species. Right up to the end he was at work; indeed, his last communication —a note on *Boronia floribunda*—was read at the September meeting of the Linnean Society, N.S.W., only ten days before his death.

Outside the domains of botany he was perhaps most interested in geographical exploration, and for many years was an enthusiastic member and officer of the Victorian Branch of the Geographical Society, in which capacity he was intimately associated with many expeditions, such as, in recent times, those of Giles and the still more recent Elder expeditions, whilst his own explorations were of no mean order. His keen and almost pathetic interest in the fate of Leichardt is well known to everyone with whom he came in contact, while during the past few years his strongest wish in connection with explorations, and in the attempt to realize which he spent much time and energy, has been to see an Antarctic expedition fitted out by the Australasian colonies.

In 1890 he presided over the first meeting of the Australasian Science Association held in Melbourne, and those who listened to his presidential address, and to whom perhaps he was mostly known as a distinguished botanist, could not help being struck with the breadth of his knowledge and the catholicity of his interests.

He was above all things an ardent student and investigator, and an indefatigable worker. For outward appearances, and even for what would be to most men the ordinary comforts of life, he cared absolutely nothing. So long as he could do his work he was content, and though by no means physically robust, the amount of work which he got through was something astounding. His correspondence alone would have been work enough for any ordinary man. In this respect he was most punctilious, and his correspondents always knew that their efforts would be appreciated and promptly acknowledged. Only ill-health would prevent the answering of a letter or the acknowledgment of a specimen.

The last meeting which he attended was the September one of our club, and after so many years during which he has been going in and out amongst us it is hard to realize that "the Baron," as he was always called, had really passed away. At times we have smiled at the quaintness of his speech and manner, but behind this there has been the deep respect and admiration for the man who devoted himself with such wholeheartedness to the work which he carried out so well and so faithfully. The whole of his income and all his means were expended either in private generosity or in the furtherance of science work, and he died a poor man.

In 1888 the Royal Society of London honoured him with the award of one of their gold medals, and the French Institute elected him a corresponding member, but none of the honours justly given to him made the least difference in the simple and friendly way in which he used to come in and out amongst us, and it will be many years before we grow accustomed to the absence of the once familiar figure of the Baron.

DECADES PLANTARUM NOVARUM AUSTRO-AFRICANARUM.

Auctore R. Schlechter.

(Continued from p. 222.)

DECAS IV.

31. **Lotononis buchenroederoides**, sp. n. Suffrutex erectus, habitus *Dichili*, ramosus, pedalis et ultra; ramulis erectis teretibus glabris distanter foliatis, gracilibus, subscabridis; foliis erectis nunc internodia haud æquantibus, nunc vix superantibus, trifoliolatis glabris, petiolo foliolis linearibus apice nunc subuncinatis, apiculatis, 0·6–1 cm. longis, æquilongo; stipulis geminis foliaceis erectis, foliolis similibus, petioli longitudine; pedunculis gracilibus erectis, foliis oppositis, 2–3-plo longioribus laxe 2–3-floris, bracteis linearibus pedicello brevi æquilongis; calyce glabro, vel tenuiter setulis appressis strigilloso, c. 0·5 cm. longo, segmentis brevibus subulatis tubo brevioribus, infimo superioribus paulo longiore; vexillo e basi breviter unguiculata subreniformi apice brevissime apiculata, glaberrimo, 1·2 cm. longo, alis unguiculatis, lamina oblonga obtusa, basi breviter auriculata, vexillo paulo brevioribus, vexillo cucullato-naviculari apice subincurvo obtuso, glaberrimo, unguiculis gracilibus, 1·1 cm. longo; ovario margine superiore puberulo, cæterum glabro, stylo filiformi glabro incurvo, antheras haud excedente; legumine lineari, compresso, margine superiore excepto glabra, pluriovulata, 2·5–3 cm. longa, 0·5 cm. lata.

Habitat in regione austro-orientali: "Lesseyton Neck" pone Queenstown, alt. c. 4000 ped., Jan. 1896; *E. E. Galpin*, No. 1951.

Nearest allied to *L. genuflexa* Bth., but easily distinguished by its stipules, and the want of pubescence on the branchlets and leaves. The alæ and vexillum are violet, according to Mr. Galpin; in drying they turn dull greenish.

32. **Rhynchosia monophylla**, sp. n. Suffrutex perennis e basi ramosus; ramis decumbentibus filiformibus elongatis exsiccatione subangulatis, tenuiter patenti-pilosis plus minus distanter foliatis; foliis simplicibus ovatis vel ovato-oblongis acuminatis apiculatisve basi cordatis utrinque tenuiter puberulis, reticulato-nervosis, 2·5–4 cm. longis, medio fere 2–2·7 cm. latis, petiolo more ramosum piloso, 1–1·5 cm. longo; stipulis ovato-lanceolatis acuminatis vel acutis striato-nervosis, puberulis, petiolo duplo vel plus duplo brevioribus; floribus in axillis foliorum binis ternisve fasciculatis, graciliter pedicellatis; pedicellis filiformibus pilosis, petiolo æquilongis; bracteis parvulis mox deciduis; calyce puberulo, 0·6 cm. longo, segmentis linearibus acutis; vexillo suborbiculari-rhomboideo, apice brevissime apiculato, basi cuneato, 1·1 cm. longo, 0·9 cm. lato, alis graciliter unguiculatis obliquis, lamina semiobovata obtusissima, basi margine superiore breviter auriculata, carinæ paulo brevioribus, carina cucullata obtusa apice incurva, glabra, vexillo subæquilonga; ovario elliptico-ovato villoso, stylo filiformi glaberrimo dimidio superiore incrassato incurvo, antheras

excedente; legumine oblique ovato-elliptico, valde compresso, basi acuto, apice acuminato, 2-ovulato, 1·1 cm. longo, 0·5–0·6 cm. lato.

In regione austro-orientali: In collibus pone Barberton (Transvaaliæ), alt. c. 4000 ped., Sept. 1889; *E. E. Galpin*, No. 489.

Differing from *R. simplicifolia* E. Mey., the only South African species with undivided leaves, by its bracts and inflorescence.

33. **Brunia Marlothii,** sp. n. Frutex erectus ramosus fide collectoris 5–6-pedalis; ramis erectis cano tomentosis, dense foliatis; foliis imbricatis erectis linearibus acutis cano-tomentosis margine villoso ciliatis apice incurva glabrescentibus, 1–1·3 cm. longis, vix 0·2 cm. latis; floribus dense capitatis; capite c. 4 cm. diametiente, subgloboso; bracteis foliis similibus basi attenuatis, apice penicillato-ciliatis; bracteolis minoribus; calyce villoso, segmentis villosis, erectis, linearibus dimidio superiore subdilatatis, petalis plus duplo brevioribus; petalis anguste linearibus apicem versus paulo ampliatis, marginibus cochleari-incurvis, glabris, 0·8 cm. longis; staminibus erectis, petala demum paulo superantibus, filamentis filiformibus glabris, antheris linearibus, 0·2 cm. longis; ovario subcylindrico, 10-striato, glabro, apice tantum villoso-barbato, 2-loculari, loculis 2-ovulatis, placenta crassa; stylis filiformibus erectis glabris, petalorum longitudine.

Habitat in regione austro-occidentali: In convalle montis Matroosberg, alt. c. 4500 ped., Oct. 1893 (nondum deflorata); *Dr. Marloth*, No. 2012; eadem loco, Jan. 1897; *Dr. R. Marloth*, 2353.

For some time I hesitated in describing this species, fearing it might prove to be identical with *B. macrocephala* Willd., a plant of which the flowers are unknown. A comparison with the description showed several points of difference, which justify the publication of the above plant as new.

34. **Aizoon asbestinum,** sp. n. Fruticulus subacaulis, e basi ramosus; ramis valde abbreviatis dense foliatis; foliis oppositis erectis rigidis subulatis pungenti mucronatis, teretibus superne nervo medio canaliculatis, dense squamellis piliformibus deflexis niveis vestitis, basi dilata sessilibus, usque ad 1·7 cm. longis, c. 0·1 cm. diametientibus; floribus in axillis foliorum sessilibus, singulis; perigonio 5-fido, 1 cm. longo, extus sericeo-hispido, intus glabro, segmentis tubo dimidio longioribus lanceolatis acutis, erecto-patentibus, 0·6 cm. longis; staminibus numerosis, erectis, filamentis subfiliformibus apicem versus attenuatis, antheris circuitu oblongis obtusis, vix 0·1 cm. longis, dimidium segmentorum vix excedentibus; ovario glaberrimo obtuse 5-angulato, apice truncato, stylis erectis, 5-filiformibus, 0·2 cm. longis; capsula apice truncata, 5-loculari, seminibus pallide brunneis, oblique ovoideis dense tuberculatis.

Habitat in regione Kalabarica: In lapidosis montium "Asbestos Mountains" apellatorum, in ditione "Griqualand West," alt. c. 3800 ped., Dec. 1894; *Dr. R. Marloth*, No. 2075.

Very distinct from any other South African species. It belongs to the species with opposite leaves, and, owing to its needle-shaped foliage, should perhaps best be placed next to *A. sarmentosum* L. f., a plant very different in habit and floral characters from the present species.

35. **Selago Galpinii**, sp. n. Fruticulus erectus vel adscendens, e basi ramosus, spithamæa usque pedalis; ramis adscendentibus decumbentibusve, primum tenuiter pruinoso-puberulis, demum nunc glabrescentibus, bene foliatis; foliis erecto-patentibus sessilibus nunc solitariis plerumque subfasciculatis linearibus obtusiusculis, marginibus integris plus minusve revolutis, glabrescentibus, 0·7–1·2 cm. longis, usque ad 0·2 cm. latis; floribus purpureis in spicis terminalibus ovoideis densifloris subpaniculatis; bracteis ovatis plus minusve acuminatis, margine ciliatis calycem paulo excedentibus; calyce extus hispido, 5-fido, segmentis acutis, duobus superioribus paulo majoribus; corollæ calycem triplo fere excedente, tubo subcylindrico glabro, faucem versus paulo dilatato, segmentis rotundatis obtusissimis, duobus anterioribus paulo majoribus; filamentis corollæ tubo alte adnatis, antheris exsertis; stylo filiformi, antheras subexcedente; acheniis circuitu oblongis, utrinque obtusis, semiteretibus glabris, subæqualibus, 0·2 cm. longis.

Habitat in regione austro-orientali: In summo monte Hanglip, prope Queenstown, alt. 6600 ped., Mart. 1893; *E. E. Galpin*, No. 1508; in cacumine montis N'Quebanga (Glen Grey), alt. 5500 ped., Jun. 1894; *E. E. Galpin*, No. 1826; in cacumine montis Mahwaqua (Nataliæ), alt. 6000–7000 ped., Febr. 1896; *M. S. Evans*, No. 628.

Quite distinct from anything I know from S. Africa. The flowers are purplish or violet colour.

36. **Orthosiphon transvaalense**, sp. n. Suffrutex erectus, parum ramosus 1½–2-pedalis; caule quadrangulari, sulcato, angulis obtusis, villoso, basi distanter, medio ramulisque densius foliatis; foliis erecto-patentibus, ovatis vel ovato-rhomboideis, basi rotundatis, apice acutis vel subacutis, interdum obtusiusculis, margine inæqualiter dentatis, superne scabridis demum glabrescentibus, subtus puberulis, reticulato-venosis, 2–3 cm. longis, infra medium 1–2·5 cm. latis, petiolo villoso, in foliis superioribus abbreviato; spicis paniculatis; laxis, verticillis 3–5-floris; bracteis pulchre coloratis lanceolato-rhomboideis, acutis, basin versus conspicue angustatis, subpetiolatis, tenuissime ciliatis usque ad 2 cm. longis; calyce breviter pedicellato hispidulo c. 1 cm. longo, segmentis in tubum oblongum alte connatis, segmento supremo suborbiculari brevissime apiculato, segmentis 4 inferioribus setaceo-subulatis acutis, 0·2 cm. longis; corolla extus glaberrima calycem triplo fere excedente, tubo e basi cylindrico dimidio anteriore conspicue ampliato, sensim in galeam labii superioris antice truncatam, apice breviter excisam transeunte, labio inferiore producto porrecto subspathulato-cochleariformi obtuso, labium superiorum paulo excedente; staminibus corollam conspicue excedentibus; stylo filiformi apice incurvo, antheras superante.

Habitat in regione austro-orientali: In collibus prope Barberton (Transvaaliæ), alt. 3000-4500 ped., Aug. 1889; *E. E. Galpin*, No. 468.

A very fine plant, well marked by its leaves, the bracts, and corolla. The flowers are purplish, according to its discoverer, Mr. Galpin.

37. **Nivenia laxa,** sp. n. Frutex erectus fide collectoris 5–6-pedalis, ramosus, ramulis erectis tenuissime strigilloso-canescentibus, foliatis; foliis erectis trifido-bipinnatis, glabris, usque ad 7 cm. longis, segmentis filiformibus superne canaliculatis, apice subpungenti-mucronulatis; spicis laxiusculis, cylindricis, usque ad 6 cm. longis, 3 cm. diametientibus, ad apices ramulorum in axillis foliorum terminalibusve; pedunculo et rhachi tomentoso; involucro pluri- (sub 4-) foliato; foliolis crassiusculis sericeo villosis concavis, circuitu late ovatis, acuminatis, intus basi barbatis; floribus 4-nis, perigonio alte fisso, segmentis c. 1·4 cm. longis, e basi sublanceolata, attenuato-elongatis extus sericeo-tomentosis, apice paulo dilatata subacuta, extus sericeo-villosis, intus glabris; antheris lanceolatis sessilibus apice glandula obtusa apiculatis, apicem segmentorum subattingentibus; ovario subovoideo, sericeo-piloso, anulo pilorum niveorum basi circumdato; stylo erecto filiformi dimidio inferiore puberulo, medio villoso, dimidio superiore paulo attenuato glabro, 0·9 cm. longo, stigmate stylo vix crassiore obtusiusculo, brevi.

Habitat in regione austro-occidentali: In clivis montis "Matroosberg," alt. c. 5000 ped., Dec. 1895; *Dr. R. Marloth*, No. 2248.

The small branch of this species which I possess somewhat resembles the fine *N. mollissima* R. Br., but is at once distinguished by the glabrous, less cut leaves, laxer spikes, and several differences in the flowers. The segments of the perigonium seem to have been pinkish; the involucra are whitish-tomentose.

38. **Thesium abietinum,** sp. n. Frutex humilis, adscendens, ramosus; ramis squarrosis glabris, dense foliatis; foliis patentibus rigidiusculis linearibus, pungenti-mucronulatis, dorso carinatis glabris, anguste cartilagineo-marginatis, 0·4–0·6 cm. longis, medio usque ad 1·5 mm. latis; floribus ad apices ramulorum 3–5-nis glomerulatis, bracteis foliis simillimis, bracteolis erectis, perigonii tubum paulo excedentibus, dimidium loborum attingentibus; perigonio extus glaberrimo, 0·5 cm. longo, segmentis usque supra medium connatis, apicibus liberis erectis lanceolatis acutissimis, intus infra apicem margineque pilis niveis barbatis, medio fasciculo pilorum ad antheras tendente donatis; staminibus in tubo corollæ insertis, filamentis subulatis glabris, antheris æquilongis; stylo subulato erecto antherarum apicem subattingente, stigmate simplici, stylo haud crassius; nuce (nundum evoluto) striato.

Habitat in regione austro-orientali: In saxosis montis Andriesberg pone Queenstown, alt. 6600–6800 ped., Oct. 1896; *E. E. Galpin*, No. 2172.

Belongs to the section *Friesea;* well marked by the rigid leaves, and the very acute almost pungent-mucronate segments of the perigonium; in the inflorescence it is somewhat allied to *T. capitatum*, next to which I propose to place it. I have only seen very young fruits, which were longitudinally nerved and linear, as most of the section.

39. **Tulbaghia Galpinii,** sp. n. Planta pusilla, habitu speciebus parvulis *T. acutilobæ* Harv. similis, 10–15 cm. alta; foliis radicalibus 5–6 erecto-patentibus, angustissime linearibus obtusis,

basi dilatata membranascente amplectentibus, glabris, scapo paulo brevioribus vel æquilongis; scapo gracili debili, glaberrimo, apice paucifloro (in speciminibus duobus visis bifloro, an semper?), bracteis angustissimis emarcidis subhyalinis, pedicellum paulo excedentibus; pedicellis inæquilongis, filiformibus, 0·3–0·8 cm. longis; perigonio læte purpureo, tubo ovoideo, 0·5 cm. longo, basi rotundato, c. 0·3 cm. diametiente, apicem versus angustato vix 0·2 cm. diametro, segmentis lineari-lanceolatis acutis, tubo æquilongis, glabris; coronæ stamineæ squamulis usque ad basin liberis subulatis carnosis, 0·3 cm. longis; antheris late ovatis apice breviter apiculatis; ovario subgloboso glaberrimo, stylo glaberrimo, perbrevi, 0·1 cm. longo; stigmate subcapitato.

Habitat in regione austro-orientali: In clivis montis "Andriesberg," pone Queenstown, alt. c. 6000 ped., Oct. 1896; *E. E. Galpin*, No. 2179.

From all forms of *T. violacea* Bkr. the present species differs by the proportionately shorter, ovoid towards the point, distinctly narrowed perigonium-tube, and the more purplish flowers. In habit it resembles more *T. acutiloba* Harv., from which, however, it must be kept distinct on account of the separate corona-scales.

40. **Eriospermum ophioglossoides**, sp. n. Tubere subgloboso apice paulo depresso, 1–1·5 cm. diametiente; caule basi vaginis mox emarcescentibus tecto, flexuoso glabro, usque ad 6 cm. alto, apice unifoliato; folio sessili nunc lanceolato, nunc ovato interdum suborbiculari, acuminato, utrinque glaberrimo, textura subcoriaceo, 1·5–2 cm. longo, medio 0·7–1·4 cm. lato; inflorescentia ad apicem caulis abbreviata folium vix excedente, subumbellato-corymbosa, 2–7-flora; pedicellis filiformibus glabris, perigonio nunc æquilongis nunc longioribus; floribus illis *E. Bergiani* Schult. paulo majoribus; bracteis minutis, perigonio flavo, segmentis exterioribus dorso linea erubescente longitudinaliter vittatis, oblongis obtusis, 0·5 cm. longis, vix 0·3 cm. latis, segmentis interioribus æqualibus æquilongisque; staminibus erecto-patentibus, filamentis dimidio inferiore, petalis adnatis lineari-lanceolatis, apicem versus attenuatis, glabris, antheris oblongis obtusis, filamentis subduplo brevioribus; ovario ovoideo glabro, stylo subulato glabro, antherarum apicem subexcedente.

Habitat in regione austro-occidentali: In clivis montis Andriesberg pone Queenstown, alt. 6000–6800 ped., Dec. 1896; *E. E. Galpin*, No. 2221.

A very distinct little species, somewhat resembling *E. Bergianum* Schult., but having a broad leaf at the top of the stem, which in *E. Bergianum* is radical and subulate. The flowers of our species are yellow, whereas in *E. Bergianum* they are white. I have not seen any capsules of this species, but the cells of the ovary appear to be ovuled.

SHORT NOTES.

Tolypella intricata in Oxfordshire. — In September, 1889, I discovered this rare species growing in a ditch near Marston, which is about two miles from Oxford. It grew in great plenty, filling the rather deep and broad ditch from one end to the other, so that a cart-load of it might have been obtained. Its abundance made one scornful of the idea of its not appearing in the same ditch next season, but, although I carefully searched for it two or three times in 1890 and in succeeding years, I have been unable to see it again till this spring, when I again met with it, but much more sparingly. I have been told that the ditch was cleared out last autumn; can we attribute to this fact the reappearance of this erratic plant? I have noticed the *Characeæ* are usually the first plants to appear after our marsh-ditches have been cleaned, but that *Callitriche*, *Ranunculus*, and other plants subsequently prove more successful in the struggle for existence.—G. Claridge Druce.

Meconopsis cambrica in Worcestershire. — On May 29th, while walking through Grey Lady's Wood, Cleeve Hill, Worcestershire, I picked a specimen of this plant. It was growing among the ordinary woodland vegetation, and appeared perfectly wild. Unfortunately, I did not at the moment think that the record might be of interest, and, passing hurriedly through the wood, did not see or look for more. But as the plant does not seem to be given for Worcestershire, its occurrence may be worth recording.—James Britten.

Camel-fodder Plants.—I find that the following has been omitted from my list (pp. 161–172):—*Pterigeron liatroides* Bth., var. *repens* (nob.), the variety differing from the type merely in its repent instead of erect habit. Baron Mueller, on the authority of Mr. Ernest Giles (*Journ. Bot.* 1877, 345), cites *Trichodesma zeylanicum* R. Br. as being "most nutritious to dromedaries"; the number of camel-fodders is thus brought up to seventy-seven. Mueller also (*l. c.* 276) quotes Giles as the authority for the statement that the phytolaccaceous *Gyrostemon ramulosus* Desf. is a camel-poison, as is *Gastrolobium spinosum* Bth., according to Mr. Helms (vide *Scientific Results of the Elder Exploring Expedition*, p. 348).—Spencer Moore.

Lychnis Flos-cuculi with entire petals. — Mr. W. Wise, of Launceston, sends a fresh specimen of this curious form from near Tower Hill Station, N. Devon.

NOTICE OF BOOK.

Cytologische Studien aus dem Bonner Botanischen Institut, von Eduard Strasburger, &c. Berlin: Borntraeger. 1897.

These studies, which are reprinted from vol. xxx. of Pringsheim's *Jahrbuch*, consist partly of observations by Prof. Strasburger himself, and partly of work carried out by various observers in his laboratory at Bonn. It is a noteworthy fact that of the latter five are Americans, and only two Germans.

The first paper, "Ueber Entstehung der Karyokinetischen Spindel bei *Equisetum*," by W. J. V. Osterhout, is the most complete account hitherto published of the development of the karyokinetic spindle in plants, and hence is a very important contribution to cytology. The origin of the spindle was traced in the pollen mother-cells of *Equisetum limosum*. Briefly described, the results of his observations are as follows:—The cytoplasm is first found arranged as a network with fairly large meshes; these become elongated and converted into threads, which run parallel to the surface of the nucleus, and later these threads arrange themselves at right angles to the nuclear wall. They then gradually form themselves into groups, irregular multipolar spindles being then produced. These multipolar spindles have been described before by Belajeff and others as stages in the development of the spindle, but their exact origin has never before been traced. The next stage is the disappearance of the nuclear wall, and then the formation of the normal bipolar spindle by the fusion into two of the numerous poles.

The second paper, by David M. Mottier, deals with nuclear division in the pollen mother-cells of a number of Monocotyledons and Dicotyledons. The author is the first to make a good comparative study of nuclear division in pollen mother-cells; he also investigated one gymnosperm, *Pinus Laricio*. One of his important observations was the development of the spindle, in which, as far as he goes, he confirms Osterhout. In all the plants studied he observed in the later stages of the spindle that, excluding the fibres which radiate from the poles to the periphery of the cell, the spindle itself consists of two sets of bundles of fibres. These two sets consist of bundles of fibres attached one to each chromosome (zugfasern), and of other bundles stretching from pole to pole (leitfasern), each in connection with a chromosome. Thus by a comparative study this theory of the mechanism of chromosome movement is for the first time placed on a firm basis. Mottier came to the conclusion that the synapsis condition of the nucleus described by Moore and Farmer is an antefact; it must be pointed out, however, that Miss Sargant has observed this condition in the fresh state, and her observation seems fairly conclusive. His most important observations are, however, those of the behaviour of the chromosomes. As he points out, it is almost impossible to understand this merely from examination of them when they are attached to the spindle; the only trustworthy method is to follow out their development step by step from the prophase onwards. Pursuing this method, he confirms the observations of Belajeff and Farmer, though with a few modifications; he leaves no doubt that there is an actual longitudinal splitting of the chromosomes in the first division. He puts forward, however, the view that in the second division there is no longitudinal division, but a transverse splitting of the chromosomes: but the evidence for this is exceedingly slight. It is to be regretted that Mottier should have put forward a view of such a far-reaching theoretical importance (one which admits the existence in plants of a reducing division) as a mere appendage to an interesting and important paper.

The observations of Bronislaw Debski on nuclear division in the *Characeæ* are of interest in relation to the systematic position of that group. He finds that the form of karyokinesis agrees much more closely with that of higher plants than with that of the algæ. He also states that no reduction of the number of chromosomes takes place in the antheridia. This is very curious: a reduction must of course occur, but where must remain a mystery until further work has been undertaken.

R. A. Harper's paper, 'Kerntheilung und freie Zellbildung im Ascus,' consists of observations on nuclear division and cell formation in the ascus, chiefly of *Erysiphe*. His most interesting results are those on the relation of the nucleus and centrosome to the formation of the wall of the ascospores, results which are in themselves quite new, and have no doubt a far-reaching importance.

Walter T. Swingle contributes observations on nuclear and cell division in the *Sphacelariaceæ*. Here for the first time we have a thoroughly trustworthy account of the presence of centrosome and radiations in connection with the resting nucleus.

The last special paper in these studies consists of observations by Prof. Strasburger on nuclear division and fertilization in *Fucus*. Some of these observations overlap those of Farmer and Williams; it is a curious fact that no one should have hitherto investigated in detail the fertilization of *Fucus*, as it is an object which is peculiarly favourable. He agrees with Farmer and Williams as to the point of the life-history at which chromosome reduction takes place.

The studies end with some general conclusions by Prof. Strasburger on (1) the structure of cytoplasm, and nuclear and cell division; (2) on fertilization. These conclusions are for the most part based on the observations published in the studies under consideration, all of which show Strasburger's influence. A protest must, however, be entered here on the way in which the kinoplasm theory is, so to speak, run to death by both Strasburger and his pupils. Kinoplasm has in only one case been described in the resting condition of the nucleus, and is usually completely invisible. That kinoplasm and trophoplasm are convenient terms to describe certain conditions of cytoplasmic differentiation there is no doubt, but that cytoplasm always consists of these two elements is a totally different question, and one which rests on the flimsiest foundation.

Besides the papers mentioned above, there are observations of H. O. Juel on abnormal nuclear divisions in the pollen of *Hemerocallis fulva*, and others of D. G. Fairchild on nuclear division and fertilization in that curious fungus *Basidiobolus ranarum*.

These studies, taken together, are the most important contributions to botanical cytology which have been published for a long time. All honour is due to Prof. Strasburger for the power to gather round himself a band of such enthusiastic and competent workers.

V. H. B.

*ARTICLES IN JOURNALS.**

Bot. Centralblatt (Nos. 21, 22).—J. Grüss, 'Studien über Reservecellulose' (2 pl.).—(No. 23). J. G. O. Tepper, 'Über australische entomogene Pilze und Beschreibung Südaustralischer Varietäten von *Cordiceps Gunnii.*'

Bot. Gazette (May 21). — D. T. MacDougal, 'The Curvature of Roots' (1 pl.). — M. E. Olson, '*Acrospermum urceolatum*, a new discomycetous parasite of *Selaginella rupestris*' (1 pl.). — G. F. Atkinson, 'Preparation of material for general class use.'

Bot. Zeitung (June 1). — E. Stahl, 'Ueber den Pflanzenschlaf und verwandte Erscheinungen.'

Bull. de l'Herb. Boissier (June). — A. Magnin, 'Sur quelques Potamots rares de la Flore Franco-Helvétique.' — J. Briquet, 'Examen critique de la théorie phyllodique des feuilles entières chez les ombellifères terrestres.' — Id., 'Sur la carpologie et la systématique du *Rhyticarpus.*' — Id., 'Sur les feuilles septées chez les dicotylédones.'—Id., 'Herborisations dans le Tyrol méridional.' —G. Hochreutiner, 'Quelques feuilles composées monstreuses.'— M. Thury, 'La morphologie et l'organogénie florales des Passiflores' (2 pl.).—E. Pitard, 'Florule pélagique des Alpes et du Jura.'—E. de Wildeman, 'Une plante myrmécophile nouvelle' (*Scaphopetalum Thonneri*, sp. n.: 1 pl.).—P. Ascherson, *Cyclamen Rohlfsianum*, sp. n. —F. N. Williams, '*Gooringia*, a new genus of *Caryophyllaceæ.*'

Bull. Soc. Bot. de France (xliv. pt. 1).—(April). L. Lutz, 'Acide cyanhydrique dans les graines des Pomacées.'—L. Blanc, 'Procédés graphiques en géographie botanique.'—L. Vidal, 'Un Genévrier des environs de Grenoble.'—E. G. Camus, 'Les *Lappa* de la Flore Française.'—A. Franchet, '*Botrychium simplex* a Malesherbes' (1 pl.).— E. A. Finet, 'Le genre *Oreorchis*' (1 pl.).—(pt. 2, May). P. Guérin, 'Amidon soluble dans les feuilles de *Cola.*'—L. Lutz, 'Sur un Safran monstrueux' (1 pl.).—P. van Tieghem, 'Phanérogames sans graines (inséminées).'—P. Candargy, 'Flore de l'isle de Lesbos.'

Bull. Torrey Bot. Club (May 29).—E. G. Britton, 'Emily Loriva Gregory' (1841–1897: portr.).—J. K. Small, '*Tradescantia* in the Southern States.'—P. A. Rydberg, 'Rarities from Montana' (4 pl.). —L. R. Jones & A. J. Grout, 'Two species of *Alternaria.*' — B. D. Gilbert, 'New Bolivian Ferns.'—Id., 'New Ferns from Jamaica.'

Gardeners' Chronicle (May 29).—F. C. Lehmann, '*Trevoria* (n. gen. Orchid.) *Chloris*' (fig. 128).

Journal de Botanique (June 1).—A. Franchet, '*Isopyrum* et *Coptis*' (cont.).—J. Réchin & A. Sébille, 'Excursions bryologiques dans la Haute Tarentaise.' — C. Sauvageau, 'Les algues marines du Golfe de Gascogne' (cont.).

Journal of Linnean Society (xxxi. No. 219: April). — S. Schönlund, 'New species of *Crassula* from S. Africa.' — A. J. Ewart, 'Further Observations upon Assimilatory Inhibition.' — W. C. Worsdell, 'Development of Ovule of *Christisonia*' (3 pl.).

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Oesterr. Bot. Zeitschrift (June). — F. Pax, 'Neue Pflanzenarten aus den Karpathen.'—A. v. Degen, 'Ueber einige orientalische Pflanzenarten' (cont.).—V. Folgner, 'Zur Systematik und Pflanzengeographie der Pomaceen' (cont.). — V. Schiffner, 'Bryologische Mittheilungen aus Mittelböhmen.'

BOOK-NOTES, NEWS, &c.

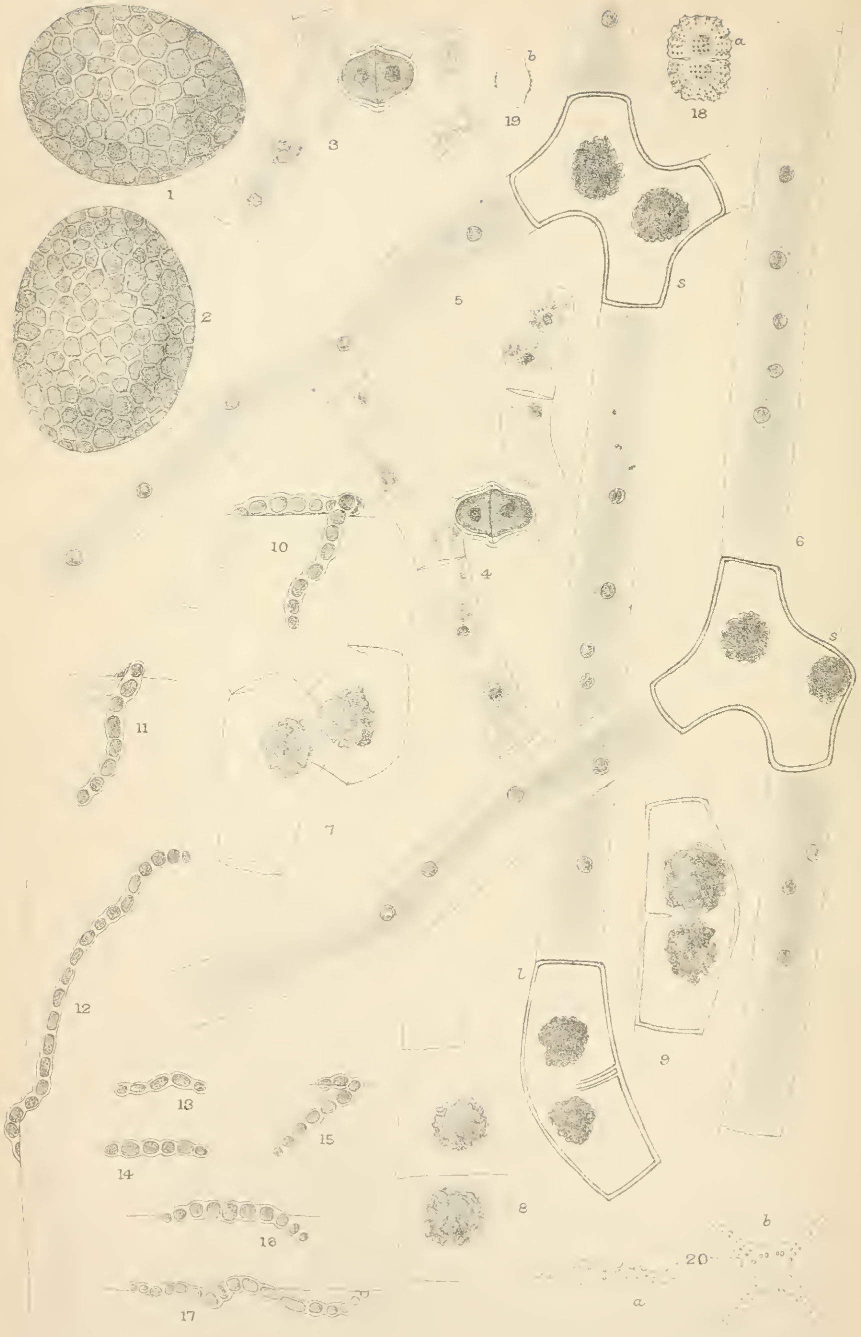
Mr. Nimmo has begun a reissue in monthly parts of Mr. A. W. Bennett's *Flora of the Alps*, which we noticed at some length in this Journal for 1896 (pp. 325-7). The extracts from press opinions which accompany the prospectus do not increase our confidence in the competence of the general reviewer: the *Standard*, for example, said:—"Mr. Bennett gives an adequate description, and one which is both clear and exact, of all the species of flowering plants common to (*sic*) Switzerland"; and the *Spectator* informed its readers that the work "contains classified accounts of all the wild flowers growing in Switzerland." The author himself is much more modest: "every species," he says (Introd. p. vi), "is at least named."

Messrs. George Murray and V. H. Blackman have sailed for the West Indies in order to work at the plant plankton of the Atlantic, especially the forms found remote from coastal waters, such as the Coccospheres and Rhabdospheres. Their method of capture is by pumping sea-water through very fine silk bags, thus attaining practically the same result as by tow-net, and without stopping the ship. Though this method has been very successful in the hands of Dr. John Murray and Mr. George Murray, and Coccospheres and Rhabdospheres have already been obtained by it in the hands of Capt. Milner (see *Nature*, April 1st, 1897), this is the first organized plankton expedition travelling by mail steamer and relying entirely on tow-netting the water pumped on board. The result can hardly fail to be instructive.

One of our correspondents has not unreasonably taken exception to the advertisement of the "Floral Gems of Ballyvaughan" which has appeared on the cover of our last two numbers, on the ground that it may possibly lead to the extirpation of rare plants. The advertisement appeared without our knowledge, and perhaps should not have been inserted; but we do not think it will lead to mischief, as many of the plants mentioned are neither rare nor attractive. Mr. O'Kelly, the advertiser, issues catalogues which are in themselves curiosities; they include "700 distinct varieties of *Scolopendrium vulgare*," 500 of which Mr. O'Kelly has himself collected "on the Burren Mountains about Ballyvaughan, which is really the home of the Hart's Tongue Fern." In his catalogue of ferns, a large number of names (some of them very odd ones) are followed by "O," which signifies O'Kelly; "all these O'Kelly's are my own new finds in the County of Clare."

In our last paragraph (p. 256) the name of Dr. D. H. Scott was accidentally substituted for that of Dr. G. B. Howes.

Tab 370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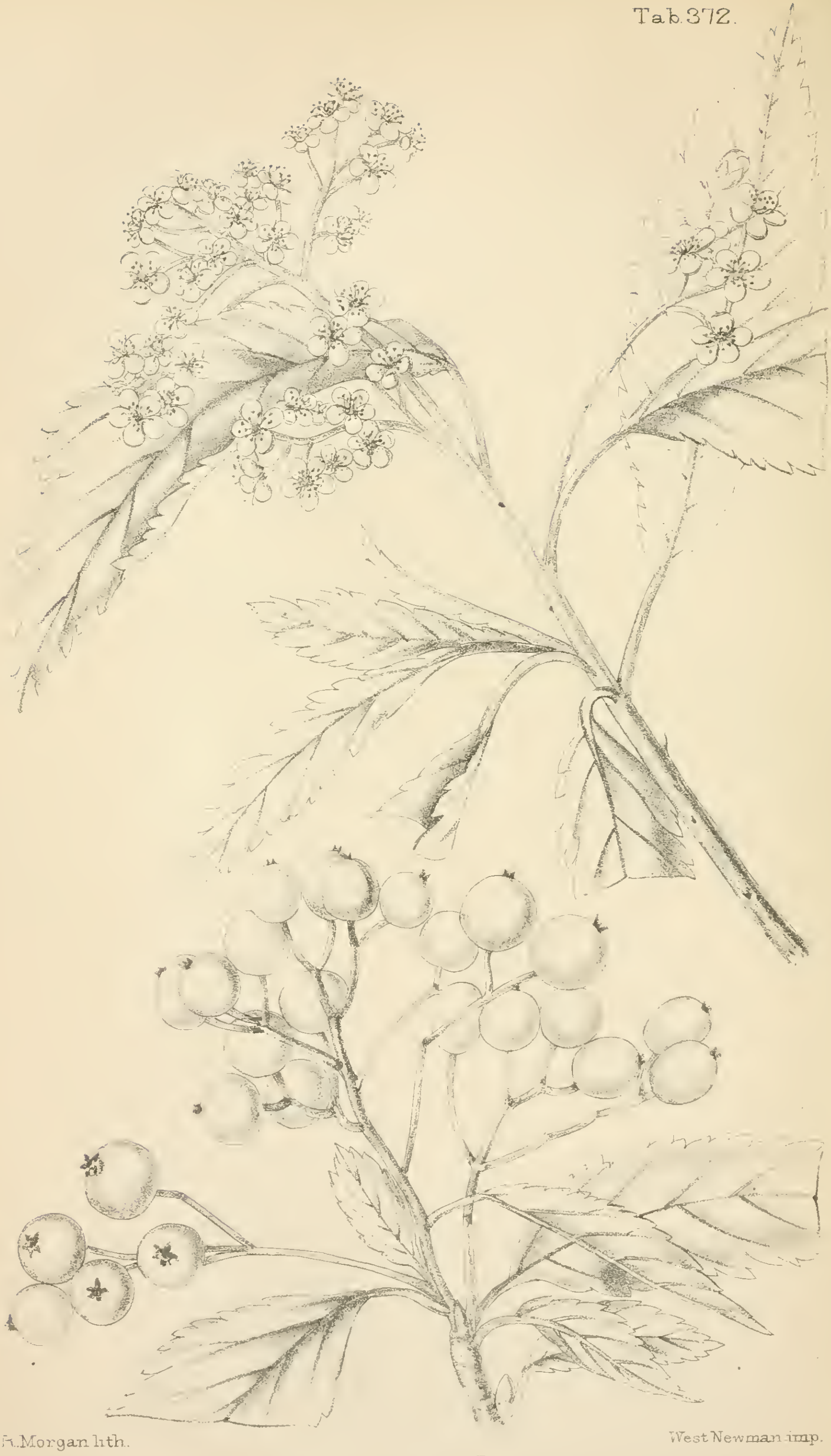

R. Morgan lith.

West Newman imp.

Pyrus minima *Ley*.

PYRUS MINIMA Ley.

By the Rev. Augustin Ley.

(Plate 372.)

Little has been discovered to throw fresh light upon this shrub since the short notice of it contributed by me to this Journal for 1895, p. 84. The publication of a plate of the plant affords me an opportunity for gathering up all the information upon it which I am able to give, and for publishing a somewhat ampler description.

Pyrus minima Ley. A small spreading shrub, height 10–20 ft.; much branched, with slender branches. Leaves linear-oblong, *shallowly pinnatifid*, with three to four principal lobes, which are usually deepest at the middle or upper part of the leaf, the lowest one-third or one-fourth being without lobes; side-veins five to seven, making *a very acute angle* with the midrib, prominent on under, grooved on upper surface; under surface clothed with grey felt, which persists until the leaf falls.

Flowers produced late in May or early in June, in loose corymbs which are not flat-topped, small, resembling those of *P. Aucuparia* Gaertn.; petals cream-coloured, round; anthers on first opening *pinkish*, then dark brown; calyx erect and prominent on the unripe fruit, persistent until the fruit is ripe. Fruit *small*, *globose*, *bright coral-red*, bitter, ripening in the end of August or the beginning of September; perfume in the flowers resembling that of fresh *Cratægus Oxyacantha*.

Locality. On a limestone mountain cliff called Craig Cille, near Crickhowel, Breconshire; also on limestone rocks at Blaen Onnen, two miles westward from Craig Cille. Undoubtedly native, and in great abundance at the former station, where the shrubs clothe the limestone cliff to its head at 1600 ft.; seedlings also being frequent. *P. intermedia*, *P. Aria* var. *rupicola*, and *P. Aucuparia* occur on the same cliff; but the very distinct habit and fruit of the present plant, as well as other reasons, forbid the idea of hybridity.

P. minima differs from *P. scandica* Syme in the leaves being narrower, with a more linear outline, and much shallower lobes, except upon the young leading shoots; and especially in the fruit being globose, small, and bright red. Fresh specimens of this Arran form, kindly communicated to me by the Rev. D. Landsborough, show its anthers to be, as in *P. minima*, light pink upon first opening, becoming brown afterwards.

From *P. intermedia* Ehrh. (as represented by the Piercefield Park plant) it differs by the slender, branching habit; by the greyer felt of the smaller, much more linear leaves, which have the lobes terminating in a much sharper point; by the flowers being less than half the size; by the colour of the anthers; and finally by the small fruit. *P. intermedia* has long, thick, nearly undivided branches, very showy flowers larger than in *P. Aria* Ehrh., with long stamens and rather brightly pink anthers, and large fruit.

Pyrus minima is one of a series of closely allied forms, two of which have long been known to inhabit the Scottish Arran, and have been described under the names of *P. scandica* Syme and *P. fennica* Bab. Prof. Koehne, in an interesting communication made by him to the Edinburgh Botanical Society, the substance of which was reproduced in this Journal, 1897, p. 99, gives his judgment on these Arran and Breconshire plants, specimens of which were submitted to him through Prof. Conventz. Prof. Koehne thinks all the Arran plants, together with the Breconshire *P. minima*, to be members of a series of hybrids between *Aria suecica* Koehne (*Pyrus scandica* Ascherson) and *Sorbus Aucuparia* (*Pyrus Aucuparia* Gaertn.). *Aria suecica* Koehne is at least extremely rare in Britain as a native plant, and is far from common in cultivation. A single tree found by me near Merthyr Tydvil, Breconshire, about eleven miles from the station for *P. minima*, was pronounced by Prof. Koehne to be true *A. suecica*; but it seems still to be doubtful whether it occurs at all in Arran, where two of the supposed hybrids are found.

I venture to express a doubt of the desirability of naming such a series of plants as these *Pyrus*-forms, or, again, the Cinquefoils ranging between *P. reptans* L. and *P. silvestris* Neck., or, again, certain groups of closely-allied Brambles, simply as "hybrids." Although favoured by great authorities, and no doubt expressing an interesting theory of the origin of such races, its use in this way deprives us of a term to express the very different phenomenon of ordinary hybridity as affecting individual plants.

The figure of the flowering spray is from a drawing by Mrs. F. J. Hanbury; that of the fruit from one by Miss Marion Gee.

REVISION OF EXTRA-TROPICAL SOUTH AFRICAN ASCLEPIADACEÆ.

By Rudolph Schlechter.

(Continued from Journ. Bot. 1896, p. 458.)

Suborder II. Cynanchoideæ.

B. Secamoneæ.

XXVII. Secamone R. Br. in Mem. Wern. Soc. i. 53 (1811); Dcne. in DC. Prodr. viii. 501 (1844); Bth. & Hk. f. Gen. Pl. ii. 746 (1876).

1. S. Thunbergii E. Mey. Comm. Pl. Afr. Austr. 224 (1837); Dcne. *l. c.* 501 (1844). *Periploca Secamone* Thbg. Flor. Cap. 233 (1823).

Cape Colony, Kaffraria, East Griqualand, Pondoland, Natal, Zululand, Orange Free State, Transvaal.

2. S. frutescens Dcne. *l. c.* 501 (1844). *Astephanus frutescens* E. Mey. *l. c.* 220 (1837).

Uitenhage, Albany, Kaffraria, East Griqualand, Pondoland, Natal, Zululand, Orange Free State, Transvaal.

3. S. Gerrardi Harv. ex Schltr. in Journ. Bot. 1895, 353.
Kaffraria, Pondoland, Natal, Zululand.

C. TYLOPHOREÆ.

Subtribus I. CEROPEGINEÆ.

XXVIII. SISYRANTHUS E. Mey. Comm. Pl. Afr. Austr. 197 (1837); Dcne. in DC. Prodr. viii. 649 (1844); Bth. & Hk. f. Gen. Pl. ii. 779 (1876).

1. S. VIRGATUS E. Mey. *l. c.* 197 (1837); Dcne. *l. c.* 649 (1844); Harv. Thes. Cap. ii. 10, t. 115 (1863).
Albany, Kaffraria, East Griqualand, Pondoland, Natal.

2. S. MACER Schltr. *S. imberbis* Harv. *l. c.* 11, t. 116 (1863). *Lagarinthus macer* E. Mey. *l. c.* 206 (1837). *Periglossum macrum* Dcne. *l. c.* 520 (1844). *Lagarinthus barbatus* Turcz. in Bull. Soc. Imp. Nat. Mosc. xxi. pt. i. 257 (1848); Walp. Ann. iii. 55 (1852).
Albany, Kaffraria, East Griqualand, Pondoland, Natal, Transvaal.

3. S. SCHIZOGLOSSOIDES Schltr. in Journ. Bot. 1894, 357.
Albany.

4. S. ANCEPS Schltr. in Engl. Bot. Jahrb. xx. Beibl. 50, 45 (1895).
Natal.

5. S. EXPANSUM Schltr. *l. c.* 46 (1895).
East Griqualand, Natal.

6. S. TRICHOSTOMUS K. Sch. in Engl. & Prantl, Nat. Pflanzenf. iv. 2 (1895).
Natal.

XXIX. BARROWIA Dcne. in DC. Prodr. viii. 629 (1844); Bth. & Hk. f. Gen. Pl. ii. 779 (1876).

1. B. JASMINIFLORA Dcne. *l. c.* 629 (1844).
Karroo, West Griqualand, British Bechuanaland, Transvaal.

XXX. MACROPETALUM Burch. ex Dcne. in DC. Prodr. viii. 626 (1844); Bth. & Hk. f. Gen. Pl. ii. 778 (1876).

1. M. BURCHELLII Dcne. *l. c.* 626 (1844).
British Bechuanaland, Transvaal.

XXXI. TENARIS E. Mey. Comm. Pl. Afr. Austr. 198 (1837); Dcne. in DC. Prodr. viii. 606 (1844); Bth. & Hk. f. Gen. Pl. ii. 775 (1876).

1. T. RUBELLA E. Mey. *l. c.* 198 (1837); Dcne. *l. c.* 606 (1844); Harv. Thes. Cap. i. (1859), 28, t. 43.
Uitenhage, Albany, Kaffraria, Natal, Transvaal.

2. T. CHLORANTHA Schltr. in Engl. Bot. Jahrb. xx. (1895), Beibl. 51, 44. *Macropetalum Benthami* K. Sch. in Engl. & Prantl, Nat. Pflanzenfam. iv. 2 (1895), 266.
Transvaal.

XXXII. DECACERAS Harv. Thes. Cap. ii. 9, t. 114 (1863).

1. D. HUTTONI Harv. *l. c.* 9, t. 114 (1863).
Albany.

2. D. **Arnottii** Schltr.* in Engl. Jahrb. xviii. (1894), Beibl. 45, 26. *Brachystelma Arnottii?* Baker in Saund. Ref. Bot. i. t. 9 (1868). *Anisotoma Arnottii* Bth. & Hk. f. ex Ind. Kew. i. 139 (1893).
Colesberg.

XXXIII. **Anisotoma** Fenzl. in Linnæa, xvii. 330 (1843); Bth. & Hook. f. Gen. Pl. ii. 781 (1876). *Anisotomaria* Presl, Bot. Bem. 103 (1844). *Lophostephus* Harv. Thes. Cap. ii. 9, t. 113 (1863),

1. A. **mollis** Schltr. in Engl. Jahrb. xviii. Beibl. 45, 26 (1894). *A. cordifolia* Fenzl. *l. c.* 331 (1843). *Anisotomaria mollis* Presl, *l. c.* 103 (1844). *Cynoctonum molle* E. Mey. Comm. Pl. Afr. Austr. 216 (1837); Dcne. in DC. Prodr. viii. 530 (1844). *Lophostephus mollis* Harv. *l. c.* 9, t. 113 (1863).
Uitenhage, Albany, Queenstown, Kaffraria.

2. A. **peduncularis** N. E. Br. in Kew Bull. 1895, 150.
Natal.

XXXIV. **Brachystelma** R. Br. in Bot. Mag. t. 2343 (1822); Dcne. in DC. Prodr. viii. 646 (1844); Bth. & Hk. f. Gen. Pl. ii. 781 (1876). *Micraster* Harv. Gen. S. Afr. Pl. ed. 2, 242 (1868). *Tapeinostelma* Schltr. in Verh. Bot. Ver. Brandenb. xxxv. 53 (1893).

1. B. **tuberosum** R. Br. *l. c.* t. 2343 (1822); Bot. Reg. t. 722 (1823); Dcne. *l. c.* 676 (1844).
"South Africa."

2. B. **spathulatum** Ldl. Bot. Reg. xiii. t. 1113 (1827).
"South Africa."

3. B. **Barberæ** Harv. ex Hook. f. in Bot. Mag. t. 5607 (1866).
Kaffraria, Transvaal.

4. B. **caudatum** N. E. Br. in Journ. Linn. Soc. Bot. xvii. 169 (1880). *Stapelia caudata* Thbg. Prodr. 46 (1794). *B. crispum* Grah. in Phil. Journ. 1830, 70; Bot. Mag. t. 3016 (1831); ? E. Mey. *l. c.* 196 (1837); Dcne. *l. c.* 647 (1844).
South-west Cape Colony.

5. B. **caffrum** N. E. Br. in Gard. Chron. 1894, xvi. 62. *Tapeinostelma caffrum* Schltr. *l. c.* 54 (1893).
Kaffraria.

6. B. **Schönlandianum** Schltr. in Engl. Jahrb. xviii. Beibl. 45, 35 (1894).
Uitenhage.

7. B. **fœtidum** Schltr. *l. c.* xx. Beibl. 50, 52 (1895).
Transvaal.

8. B. **oianthum** Schltr. *l. c.* 53 (1895).
Transvaal.

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* Erroneously printed *D. Arnoldii.*

9. B. PULCHELLUM Schltr. *l. c.* 53 (1895). *Micraster pulchellus* Harv. Gen. S. Afr. Pl. ed. 2, 242 (1868).
Natal, Transvaal.

10. B. MEYERIANUM Schltr. in Engl. Jahrb. xxi. Beibl. 54, 14 (1896). *B. caffrum* Schltr. *l. c.* xviii. Beibl. 45, 13 (1894) (nec N. E. Br.). *B. tuberosum* E. Mey. *l. c.* 196 (1837) (nec R. Br.).
Kaffraria.

Species dubia.

11. B. MICRANTHUM E. Mey. *l. c.* 196 (1837); Dcne. *l. c.* 647 (1844).
Kaffraria.

XXXV. BRACHYSTELMARIA Schltr. in Engl. Jahrb. xx. Beibl. 50, 50 (1895).

1. B. LONGIFOLIA Schltr. *l. c.* 50 (1895).
Transvaal.

2. B. MACROPETALA Schltr. *l. c.* 51 (1895).
Transvaal.

3. B. RAMOSISSIMA Schltr. *l. c.* 51 (1895).
Transvaal.

4. B. NATALENSIS Schltr. *l. c.* 50 (1895). *Dichælia natalensis* Schltr. *l. c.* xviii. Beibl. 45, 35 (1894).
Natal.

5. B. GERRARDI Schltr. *l. c.* 50 (1895). *Brachystelma Gerrardi* Harv. Thes. Cap. ii. 61, t. 196 (1863). *Dichælia Gerrardi* Harv. Gen. S. Afr. Pl. ed. 2, 241 (1868).
Natal, Zululand.

6. B. OCCIDENTALIS Schltr. *Brachystelma occidentale* Schltr. Abh. Bot. Ver. Brandenb. xxxv. 53 (1893).
Simonstown.

XXXVI. DICHÆLIA Harv. Gen. S. Afr. Pl. ed. 2, 241 (1868); Bth. & Hk. f. Gen. Pl. ii. 780 (1876).

1. D. FILIFORMIS Schltr. *Brachystelma* (§ *Dichælia*) *filiformis* Harv. Thes. Cap. i. 59, t. 93 (1859).

2. D. OVATA Schltr. *Brachystelma* (§ *Dichælia*) *ovata* Oliv. in Ref. Bot. iii. t. 226 (1871).
Colesberg.

3. D. GALPINII Schltr. in Engl. Jahrb. xviii. Beibl. 45, 25 (1894).
Transvaal.

4. D. VILLOSA Schltr. *l. c.* 25 (1894).
Transvaal.

5. D. ELONGATA Schltr. *l. c.* 35 (1894).
Somerset East, Albany.

6. D. UNDULATA Schltr. *l. c.* 36 (1894).
Uitenhage.

7. D. PYGMÆA Schltr. in Journ. Bot. 1894, 262.
Kaffraria ?

8. D. BREVIFLORA Schltr. in Engl. Jahrb. xx. Beibl. 50, 49 (1895).
Transvaal.

9. D. PALLIDA Schltr. *l. c.* 49 (1895).
Transvaal.

10. D. CIRCINATA Schltr. in Engl. Jahrb. xxi. Beibl. 54, 13 (1896). *Brachystelma circinatum* E. Mey. Comm. Pl. Afr. 196 (1837).
Wittbergen.

XXXVII. CEROPEGIA L. Gen. 65 (1737); Dcne. in DC. Prodr. viii. 641 (1844); Bth. & Hk. f. Gen. Pl. ii. 779 (1878). *Systrepha* Burch. Trav. i. 546 (1822).

1. C. AFRICANA R. Br. in Bot. Reg. t. 626 (1822); Dcne. *l c.* 642 (1844). *C. linearis* E. Mey. Comm. Pl. Afr. Austr. 194; Dcne. *l. c.* 644 (1844).
Uitenhage, Albany, Kaffraria.

2. C. STAPELIÆFORMIS Harv. in Phil. Mag. 1827, 121; Bot. Mag. t. 3567 (1836); Dcne. in DC. Prodr. viii. 643 (1844).
Uitenhage, Albany, Kaffraria.

3. C. CARNOSA E. Mey. Comm. Pl. Afr. Austr. 193 (1837); Dcne. *l. c.* 645 (1844).
Uitenhage, Albany, Kaffraria.

4. C. MULTIFLORA Baker in Saund. Ref. Bot. i. t. 10 (1869). *Systrepha multiflora* Burch. MSS. ex Baker *l. c.*
Cradock.

5. C. FIMBRIATA E. Mey. *l. c.* 194 (1837); Dcne. *l. c.* 645 (1844). *C. Sandersoni* Harv. Bot. Mag. 5792 (1869).
Pondoland, Natal, Zululand.

6. C. AMPLIATA E. Mey. *l. c.* 194 (1837); Dcne. *l. c.* 645 (1844).
Albany, Kaffraria, East Griqualand, Pondoland, Natal.

7. C. MEYERI Dcne. *l. c.* 645 (1844). *C. pubescens* E. Mey. *l. c.* 193 (1837) (nec Wall.).
Kaffraria, East Griqualand, Pondoland, Natal, Zululand, Orange Free State, Transvaal.

8. C. BOWKERI Harv. Thes. Cap. i. 9, t. xiv. (1859); Bot. Mag. t. 5407 (1864).
Kaffraria.

9. C. SORORIA Harv. ex Bot. Mag. t. 5578 (1866).
Albany, Kaffraria.

10. C. BARKLYI Hk. f. Bot. Mag. t. 6315 (1877).
Kaffraria.

11. C. MONTEIROÆ Hk. f. Bot. Mag. t. 6927 (1887).
Delagoa Bay.

12. C. RADICANS Schltr. in Engl. Jahrb. xviii. Beibl. 45, 12 (1894).
Kaffraria.

13. C. GALPINII Schltr. *l. c.* 23 (1894).
Transvaal.

14. C. TOMENTOSA Schltr. *l. c.* 33 (1894).
Kaffraria.

15. C. Woodii Schltr. *l. c.* 34 (1894).
Natal, Transvaal.

16. C. caffrorum Schltr. in Journ. Bot. 1894, 358.
Natal.

17. C. antennifera Schltr. in Engl. Jahrb. xx. Beibl. 50, 46 (1895).
Natal.

18. C. pachystelma Schltr. *l. c.* 47 (1895).
Natal, Transvaal.

19. C. setifera Schltr. *l. c.* 48 (1895).
Zululand, Transvaal.

20. C. filiformis Schltr. *Systrepha filiformis* Burch. Trav. i. 546 (1822). *C. infundibuliformis* E. Mey. *l. c.* 194 (1837); Dcne. *l. c.* viii. 645 (1844).
British Bechuanaland, Barkly, Camdeboo.

XXXVIII. Riocreuxia Dcne. in DC. Prodr. viii. 640 (1844); Bth. & Hk. f. Gen. Pl. ii. 780 (1876).

1. R. torulosa Dcne. *l. c.* 640 (1844). *Ceropegia torulosa* E. Mey. Comm. Pl. Afr. Austr. 194 (1837).
Kaffraria, East Griqualand, Pondoland, Natal, Zululand, Orange Free State, Transvaal.

2. R. Flanagani Schltr. in Engl. Jahrb. xviii. Beibl. 45, 13 (1894).
Kaffraria, Natal.

3. R. picta Schltr. *l. c.* 24 (1894).
Transvaal.

4. R. polyantha Schltr. in Journ. Bot. 1895, 272.
Kaffraria, East Griqualand, Natal, Orange Free State.

(To be continued.)

WILTSHIRE UREDINEÆ.

By Edward J. Tatum.

Some attention has now been paid to this section of the Micro-fungi of the county, with the result that a fair preliminary list is possible, including a few rare species, though still wanting some which might be expected to occur. The suffix (S.W.) indicates that the record is supposed to be new for South Wilts only, there being already a notice for North Wilts, though not in every case of quite certain identity. I am indebted to Dr. C. B. Plowright for very special help in identification. A few heterœcious species cannot, however, be named conclusively from æcidium forms. The localities are on my own authority.

Uromyces fabæ (Pers.) (S.W.). On *Vicia sepium:* 5. Clarendon; 6. Pitton; 9. Compton; 10. Alderbury.—*U. geranii* (DC.). On *Geranium pyrenaicum:* 6. Winterbourne Earls; 7. Old Sarum; 10. Britford.—*U. dactylidis* Otth. Æcidium of this or of *Puccinia* *magnusiana* or possibly of *U. poæ* on *Ranunculus bulbosus:* 6. King Manor; 7. Stratford; 10. Harnham.—*U. poæ* Rabh. Æcidium on *R. Ficaria* (S.W.): 5. W. Dean; 6. Hurdcott; 7. Stratford; 9. Dinton; 10. Harnham. — *U. rumicis* (Schum.). On *Rumex obtusifolius:* 7. Stratford. On *R. Acetosa:* 6. Winterbourne Earls; 9. Compton; 10. Alderbury. — *U. ficariæ* (Schum.). On *Ranunculus Ficaria:* 5. Clarendon; 6. Laverstock; 10. Trafalgar.

Puccinia thesii (Desv.). On *Thesium humifusum:* 6. Winterbourne Earls; 7. Durnford Down. — *P. lapsanæ* (Schultz). On *Lapsana communis:* 5. W. Grinstead; 6. Pitton; 7. Stratford; 9. Dinton; 10. Alderbury. — *P. pulverulenta* Grev. On *Epilobium hirsutum:* 6. Hurdcott. On *E. parviflorum:* 5. Bentley Wood; 10. Alderbury. On *E. montanum:* 5. W. Dean. On *E. obscurum:* 5. Clarendon.—*P. violæ* (Schum.). On *Viola sylvestris:* 5. W. Dean; 10. Alderbury. —*P. pimpinellæ* (Strauss). On *Pimpinella Saxifraga:* 10. Harnham. On *Anthriscus sylvestris:* 6. Milford; 7. Old Sarum. On *Angelica sylvestris:* 5. Bentley Wood. — *P. menthæ* Pers. On *Calamintha Clinopodium:* 9. Compton; 10. Harnham; Alderbury.—*P. primulæ* (DC.). On *Primula vulgaris:* 5. W. Dean.—*P. saniculæ* Grev. On *Sanicula europæa:* 5. W. Grinstead; 6. Clarendon; 10. Harnham. *P. graminis* Pers. Æcidium on *Berberis vulgaris:* 7. Old Sarum.—*P. coronifera* Klebahn. Æcidium on *Rhamnus catharticus* (S.W.): 5. Standlynch Down; 6. Pitton; 7. Durnford Down; 10. Harnham. —*P. phalaridis* Plow. Æcidium on *Arum maculatum* (S.W.): 5. Clarendon; 6. Hurdcott; 7. Old Sarum; 9. Compton; 10. Britford. —*P. dispersa* Erich. & Henn. On corn: 6. Petersfinger; 7. Woodford. — *P. caricis* (Schum.). On *Carex acutiformis:* 6. Hurdcott. Æcidium on *Urtica dioica* (S.W.): 5. Clarendon; 6. Hurdcott; 7. Fisherton; 9. Dinton; 10. Harnham. — *P. phragmitis* (Schum.). Æcidium on *Rumex* sp. (S.W.): 7. Stratford; 10. Alderbury.—*P. magnusiana* Körn. Æcidium of this or of *Uromyces poæ* on *Ranunculus repens:* 5. W. Dean; 6. Laverstock; 7. Fisherton; 9. Dinton; 10. Netherhampton. — *P. suaveolens* (Pers.) (S.W.). On *Cnicus arvensis:* 5. Farley; 6. Ford; 7. Salterton; 9. Dinton; 10. Harnham.—*P. bullata* (Pers.). On *Conium maculatum:* 6. Queen Manor; 7. Stratford. — *P. hieracii* (Schum.). On *Cnicus lanceolatus*; 10. Britford. On *Centaurea Scabiosa* and *Crepis virens:* 10. Standlynch. On *Hieracium sciaphilum:* 10. Harnham. On *H. boreale*: 9. Compton. — *P. taraxici* Plow. On *Taraxacum officinale:* 7. Durnford; 10. Harnham. — *P. polygoni* Pers. On *Polygonum Convolvulus:* 5. W. Dean; 6. Milford; 7. Stratford; 8. Wylye; 10. Hare Warren. On *P. amphibium:* 10. Britford.—*P. oblongata* (Link.). On *Luzula campestris:* 7. Stratford. — *P. lychnidearum* Link. (S.W.). On *Lychnis dioica:* 10. Alderbury. — *P. fusca* (Relhan). On *Anemone nemorosa* (S.W.): 5. W. Grimstead; W. Dean; 10. Alderbury.—*P. bunii* (DC.). On *Conopodium denudatum:* 5. W. Grimstead.—[*P. malvacearum* Mont., which was found at Salisbury by Hussey in 1873, is still very common.] — *P. adoxæ* DC. On *Adoxa Moschatellina:* 5. W. Grimstead; Clarendon; 10. Alderbury. — *P. buxi* DC. On *Buxus sempervirens* (S.W.); 10. Hare Warren; Trafalgar.

Triphragmium ulmariæ (Schum.). On *Spiræa Ulmaria:* 5. W. Dean; 6. Hurdcott.

Phragmidium fragariastri (DC.). On *Potentilla Fragariastrum* (S.W.): 5. W. Grimstead; 6. Pitton; 9. Compton; 10. Alderbury. —*P. sanguisorbæ* (DC.). On *Poterium Sanguisorba:* 5. W. Dean; 6. Pitton; 7. Durnford Down; 10. Harnham Hill. — *P. violaceum* (Schultz). On *Rubus* (*fruticosus*)*:* 5. W. Grimstead; 9. Compton. —*P. rubi* (Pers.). On *Rubus* (*fruticosus*) (S.W.): 5. W. Grimstead; 6. Hurdcott; 10. Alderbury.—*P. subcorticinum* (Schrank). On *Rosa canina:* 5. W. Grimstead; 6. Petersfinger; 9. Dinton; 10. Race Plain.

Endophyllum euphorbiæ (DC.). On *Euphorbia amygdaloides* (S.W.); 5. Clarendon.

Gymnosporangium clavariæforme (Jacq.). Æcidium of this or of *G. confusum* Plow. on *Cratægus Oxyacantha:* 10. Harnham Hill.

Melampsora helioscopiæ (Pers.). On *Euphorbia Helioscopia* (S.W.): 6. Laverstock; 7. Durnford; 10. Standlynch. — *M. lini* (Pers.). On *Linum catharticum:* 7. Old Sarum; 10. Harnham.—*M. vitellinæ* (DC.). On *Salix fragilis:* 10. Harnham.

Coleosporium senecionis (Pers.). On *Senecio vulgaris:* 5. W. Grimstead; 6. Winterbourne Earls; 10. Harnham Hill.

Uredo symphyti DC. On *Symphytum officinale* (S.W.): 5 & 6. Clarendon; 7. Stratford; 10. Bodenham.

Cæoma euonymi (Gmelin). On *Euonymus europæus:* 6. Clarendon. — *C. mercurialis* Pers. On *Mercurialis perennis:* 5. W. Dean; 10. Alderbury; Downton.—*C. ari-italici* Duby. On *Arum maculatum:* 10. Netherhampton.

Æcidium grossulariæ (Gmelin). On *Ribes Grossularia:* 5. W. Grimstead; 6. Winterbourne Earls; 10. Alderbury. — *Æ. leucospermum* DC. On *Anemone nemorosa:* 5. Bentley Wood; 10. Standlynch Down.

WELWITSCH'S AFRICAN FRESHWATER ALGÆ.

By W. West, F.L.S., and G. S. West, A.R.C.S.

(Plates 365–370.)

(Concluded from p. 272.)

XXI.—Lyngbyeæ.

1. Symploca Kütz. (1843).

1. S. Muscorum (Ag.) Gomont in *Journ. de Botaniq.* iv. 354 (1890); in *Ann. Sci. Nat.* 7e série, Bot. xvi. 110–2, t. 2, f. 9 (1892). *Oscillatoria Muscorum* Ag. *Syst. Algar.* 65 (1824).

(α). Crass. trich. 5·5–6 μ.

Loanda. Ad terram humidam urbis Loandæ, tempore pluvio; April 1854. No. 161.

(β). Crass. trich. 8–9 μ.

Huilla. Alga atro-viridis, viscoso-gelatinosa, exsiccata fere penicilliformis, inter muscos texta, in maxime umbrosis; Morro de Monino; Febr. 1860. No. 181.

2. Lyngbya C. Ag. (1824).

1. **L. aureo-fulva,** sp. n. L. terrestris, strato spongioso membranaceo aureo-fulvo vel flavo; filis dense intricatis, flexuosis; vaginis firmis, glabris et lamellosis, flavis vel flavo-brunneis; trichomatibus ærugineis, ad dissepimenta leviter constrictis, apicibus haud attenuatis; cellulis quadratis, nonnunquam diametro paullo brevioribus; protoplasmate delicate granulato. Crass. fil. 13·5–14·5 μ; crass. trich. 8·5–9·5 μ.

Pungo Andongo. Freq. in humidis ad dextram flum. Cuanza ex Candumba usque Quisonde; March 1857. No. 10. "Alga terrestris, in vivo aureo-fulva vel flavescens, membranis spongiosis latissimis graminum cæspitibus intertexta, Droseraceis et Eriocaulonaceis solum spongiosum offerens."

2. L. Martensiana Menegh. *Conspect. Algol. Eugan.* 12 (1837); Gomont in *Ann. Sci. Nat.* 7e série, Bot. xvi. 145–6, t. 3, f. 17 (1892). Crass. fil. 11–14 μ; crass. trich. 8–10 μ.

Golungo Alto. Ad muscos prope fontem magn. ad Bança de Soba Bango; Sept. 1855. No. 159.

Loanda. Cum *Symploca Muscorum* ad terram humidam urbis Loandæ, tempore pluvio; April 1854. No. 161.

3. L. ærugineo-cærulea (Kütz.) Gomont, *l. c.* 146–7, t. 4, f. 1–3 (1892). *Oscillaria ærugineo-cærulea* Kütz. *Phyc. Gener.* 185 (1843); *Tab. Phyc.* i. (1845–9), 28, t. 39, fig. ix. Crass. fil. 6·7–7·5 μ; crass. trich. 4·8–5·3 μ.

Pungo Andongo. Inter *Porphyrosiphonem Notarisii* prope Condo; March 1857. No. 9.

4. L. versicolor (Wartm.) Gomont, *l. c.* 147, t. 4, fig. 4, 5 (1892). *Phormidium versicolor* Wartm. (1861).

Mossâmedes. Ad ripas limosas flum. Bero pr. Cavalleiros; June 1859. No. 175.

3. Phormidium Kütz. (1843).

1. **P. subsolitarium,** sp. n. P. filis non in stratum, ad basin affixis, solitariis vel 2–3 associatis, brevibus, leviter curvatis vel subrectis; vaginis latis, multe hyalinis et haud facile visis; trichomatibus læte ærugineis, moniliformibus, vaginam haud complentibus, apicibus non attenuatis; cellulis ellipticis vel elliptico-oblongis, post divisionem subglobosis, protoplasmate parietali; cellula apicali rotundata, calyptra nulla. Crass. fil. 5 μ; crass. trich. 2 μ.

Pungo Andongo. In *Batrachospermo gracillimo* ad lapides submersas in rivulo de Tangue; May 1857. No. 3.

The moniliform cells and the delicate hyaline sheath place this plant in the genus *Phormidium*, although the plants often occur singly. The elliptic cells and subsolitary habit characterize the species.

2. **P. angustissimum,** sp. n. P. strato tenuissimo membranaceo pallide ærugineo; filis flexuosis et tortuoso-intricatis; vaginis muco hyalino agglutinatis; trichomatibus angustissimis, læte ærugineis, ad dissepimenta constrictis, apicibus rectis et non capitatis;

cellulis diametro 2–8-plo (plerumque 4–5-plo) longioribus, protoplasmate homogeneo. Crass. trich. 0·6–0·8 μ.

Mossâmedes. Inter *Glœotrichiam æthiopicam* et *Charam* sp. in rivo Caroca prope Cabo Negro; Sept. 1859. No. 19.

Pungo Andongo. Inter *Nostoc repandum* ad rupes editiores vulcan. prope Cabondo tempore pluvio; Febr. 1857. No. 21.

This narrow species is nearest to *P. laminosum* (Ag.) Gomont, but it is distinguished by its much narrower trichomes, which are constricted at the dissepiments, and its usually much longer cells.

3. P. LAMINOSUM (Ag.) Gomont in *Journ. de Botaniq.* iv. 355 (1890); in *Ann. Sci. Nat.* 7e série, Bot. xvi. 167–8, t. 4, f. 21, 22 (1892). *Oscillatoria laminosa* Ag. in *Flora*, x. 633 (1827). Crass. fil. 1·5 μ.

Golungo Alto. Ad terram limosam post pluvias; Dec. 1855. No. 166.

4. P. CORIUM (Ag.) Gomont in *Journ. de Botaniq.* iv. 355 (1890); in *Ann. Sci. Nat. l. c.* 172–3, t. 5, f. 1, 2 (1892). *Oscillatoria Corium* Ag. *Dispos. Algar. Suec.* 36 (1812). Crass. fil. 3·4–4·4 μ.

Sierra Leone. Cum *Oscillatoria animali* ad parietes humid. verticales urbis Freetown freq. latissimis plagis atro-nitentibus parietes obducens; Sept. 1853. No. 167.

5. P. PAPYRACEUM (Ag.) Gomont in *Journ. de Botaniq.* iv. 355 (1890); in *Ann. Sci. Nat. l. c.* 173–5, t. 5, f. 3, 4 (1892). *Oscillatoria papyracea* Ag. *Syst. Algar.* 61 (1824).

Sierra Leone. Ad muscos (hepaticeas) humidos in domicil. parietibus verticalibus urbis Freetown frequens tempore pluvio; Sept. 1853. No. 174.

6. P. RETZII (Ag.) Gomont in *Journ. de Botaniq.* iv. 355 (1890); in *Ann. Sci. Nat. l. c.* 175–8, t. 5, f. 6, 9 (1892). *Oscillatoria Retzii* Ag. *Dispos. Algar. Suec.* 36 (1812). Crass. trich. 9·5–10·5 μ.

Pungo Andongo. Ad muscos (Jungermannias) submersas in rivulo Tangue pr. Catete; May 1857. No. 165.

7. P. AUTUMNALE (Ag.) Gomont in *Ann. Sci. Nat. l. c.* 187–190, t. 5, f. 23, 24 (1892). *Oscillatoria autumnalis* Ag. *l. c.* 36 (1812).

Forma TENUIS. Crass. trich. 3·8 μ.

Golungo Alto. Cum *P. laminoso* ad terram limosam post pluvias; Dec. 1855. No. 166.

4. **Proterendothrix**, gen. n.

Plantæ minutæ, primum endophyticæ, tum epiphyticæ; fila solitaria vel 2–3 associata, brevia et simplicia; vaginæ achroæ, hyalinæ et amplæ, marginibus irregularibus; trichomata solitaria intra vaginam unamquamque.

1. **P. scolecoidea**, sp. unica (tab. 365, figs. 3–6). P. trichomatibus ærugineis et flexuosis, apicibus sæpe subattenuatis; cellulis subquadratis vel diametro paullo brevioribus. Crass. fil. 9·5–19 μ; crass. trich. 4·5–5·5 μ.

Huilla. In *Porphyrosiphone Notarisii*, prope lac. Ivantala; March 1860. Nos. 17 and 18.

This genus must be placed in the *Lyngbyeæ* on account of the structure of the sheath, which contains a solitary trichome. The comparative width of the sheath, its hyaline character with irregular margin, along with the peculiar habit of the plant, characterize the genus. The younger plants (consisting of short filaments of 12–20 cells) are endophytic, occurring between the lamellæ of the sheath of *Porphyrosiphon.* As they increase in size they appear to break through the outer lamellæ of the sheath of the host, and to closely attach themselves to its outer surface by means of their own mucous envelope, which is now considerably broader.

5. OSCILLATORIA Vauch. (1803).

1. O. LIMOSA Ag. *Dispos. Algar. Suec.* 35 (1812); Gomont in *Ann. Sci. Nat.* 7e série, Bot. xvi. 210–2, t. 6, f. 13 (1892). Crass. trich. 9·5–15·5 μ.

Sierra Leone. Ad terram et parietes juxta fontes prope Freetown; Sept. 1853. No. 168.

2. O. TENUIS Ag. *Algar.* Decas ii. 25 (1813); Gomont, *l.c.* 220–1, t. 7, f. 2–3 (1892). Crass. trich. 6–7·5 μ.

Ins. Principis. In stagnantibus prope Bahia de S. Antonio, ad limum subexsiccantem late cæspitosa; Sept. 1853. No. 169.

Mossâmedes. Cum *Tolypotriche limbata* in stagnis profundis prope Cavalheiros; Aug. 1859. No. 191.

3. O. ANIMALIS Ag. in *Flora*, x. 632 (1827); Gomont, *l. c.* 227–9, t. 7, f. 13 (1892). Crass. trich. 2·8–3 μ.

Sierra Leone. Cum *Phormidio Corio* ad parietes humid. verticales urbis Freetown freq. latissimis plagis atro-nitentibus parietes obducens; Sept. 1853. No. 167.

4. O. FORMOSA Bory, *Dict. Class. d'Hist. Nat.* xii. 474 (1827); Gomont, *l. c.* 230–1, t. 7, f. 16 (1892). Crass. trich. 4–5·5 μ.

Loanda. In limo humido urbis Loandæ; April 1858. No. 170.

5. O. OKENI Ag. in *Flora*, x. 633–4 (1827); Gomont, *l. c.* 232, t. 7, f. 18 (1892). Crass. trich. 5·7–7 μ.

Loanda. In fonte tepida, sulphate abundanti pr. S. Pedro freq.; July and Aug. 1854. No. 164.

6. **O. angustissima,** sp. n. O. strato expanso ærugineo; trichomatibus angustissimis, læte æruginei, flexilibus, elongatis et intricatis, apicibus non attenuatis nec capitatis, ad dissepimenta non constricta; cellulis diametro 1½–2-plo longioribus, dissepimentis indistinctis; protoplasmate homogeneo. Crass. trich. 0·6 μ.

Loanda. Cum *O. Okeni* in fonte tepida, sulphate abundanti pr. S. Pedro freq.; July and Aug. 1854. No. 164.

The specimens of this species are very fine; it is a totally distinct plant from *Phormidium angustissimum*, though it is of the same thickness. It possesses no sheath, and the trichomes are much firmer and not so tortuose as those of the latter; its cells also are shorter and more indistinct.

XXII.—Chamæsiphoneæ.

1. Sphærogonium Rostaf. (1883).

1. S. incrustans (Grun.) Rostaf. in *Rosprawy Sprawozd. Posiedz. Akad. Umiej.* x. 282, 304–5, t. v. f. 1–7 (1883). *Chamæsiphon incrustans* Grun. in Rabenh. *Flor. Europ. Alg.* ii. 149. Lat. 3–3·5 μ; long. 6–10 μ.

Pungo Andongo. Epiphyticum supra *Zygnema ericetorum* ad Podostemaceas in riv. de Cabondo; Febr. 1857. No. 108

XXIII.—Cystogoneæ.

1. Dermocarpa Crouan (1858).

1. **D. depressa,** sp. n. D. cellulis plus minusve aggregatis, multe depressis, irregulariter discoideis; protoplasma cellulæ uniuscujusque sporas 8 formante. Diam. cell. 5–10 μ, altit. 2·7–3·8 μ; diam. spor. 1·8 μ.

Loanda. Epiphytica supra *Pithophoram radiantem* in aquariis aquæ subdulcis insulæ Cassanga pr. Morro da Cruz; April 1854. No. 197.

XXIV.—Chroococcaceæ.

1. Glœothece Näg. (1849).

1. G. confluens Näg. *Gatt. einz. Alg.* 58, t. i. g, f. 1 (1849). Long. cell. 4–5 μ; lat. cell. 2 μ.

Golungo Alto. Cum *Chroococco schizodermatico* var. *badio-purpureo*, ad rupes juxta riv. Coango; June 1856. No. 139.

2. Merismopedia Meyen (1839).

1. M. glauca (Ehrenb.) Näg. *l. c.* 55, t. i. d, f. 1 (1849). *Gonium glaucum* Ehrenb. Diam. cell. 3·8–4·2 μ.

Huilla. Inter *Utriculariam*, Morro de Lopollo; April 1860. No. 179.

2. M. hyalina Kütz. *Phyc. Germ.* 142 (1845); *Tab. Phyc.* v. 12, t. 38, f. i. (1855). Diam. cell. 1·5 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

3. Tetrapedia Reinsch (1867).

1. **T. aversa,** sp. n. T. minutissima, paullo latior quam longior, profunde constricta in medio, sinu acutangulo et aperto, lobis lateralibus late rotundatis, apicibus concavis; a vertice visis elliptico-oblongis. Long. cell. 9·5–10·5 μ, lat. 10·5–11·5 μ, lat. constrict. 4–4·5 μ; crass. cell. 5·5 μ.

Pungo Andongo. In stagnis prope Anbilla (Condo); March 1857. No. 177.

4. Glœocapsa Kütz. (1843); em. Näg. (1849).

1. G. gelatinosa Kütz. *Phyc. Gener.* 174 (1843); *Tab. Phyc.* i. (1845–9), 15–16, t. 20, f. vi. *b*; Rabenh. *Flor. Europ. Alg.* ii. 39. Diam. fam. 8·5–28 μ; diam. cell. 3–5·5 μ. The integuments were very fine, and occasionally of a yellowish colour.

Ambaca. Alga rupestris, latas plagas rupium cavernæ Puri-Cacarambola internarum colore viridissimo tingens; Oct. 1856. No. 154.

2. G. PUNCTATA Näg. *Gatt. einz. Alg.* 51, t. i. F, f. 6 (1849). Diam. cell. 1·5–2 μ.

Golungo Alto. Cum *G. rupestri*, ad saxa mollia juxta cataractam riv. Coango prope Sange; Sept. 1856. No. 134.

3. G. RUPESTRIS Kütz. *Tab. Phyc.* i. (1845–9), 17–18, t. 22, f. ii.; Rabenh. *Flor. Europ. Alg.* ii. 47. Diam. cell. 2·3–3·5 μ.

Golungo Alto. Cum *G. punctata*, ad saxa mollia juxta cataractam riv. Coango prope Sange; Sept. 1856. Nos. 134 and 278.

5. Chroococcus Näg. (1849).

1. C. MINUTUS (Kütz.) Näg. *Gatt. einz. Alg.* 46 (1849). *Protococcus minutus* Kütz. *Phyc. Gener.* 168 (1843). Diam. cell. 4·8–5 μ; diam. fam. 25 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

2. C. TURGIDUS (Kütz.) Näg. *l. c.* (1849). *Protococcus turgidus* Kütz. *Tab. Phyc.* i. (1845–9), 5, t. 6. Diam. cell. 13·5 μ; diam. fam. 33 μ.

Huilla. In paludibus exsiccandis; April 1860. No. 176.

3. C. PALLIDUS Näg. *l. c.* t. i. A, fig. 2 (1849). Diam. cell. 7·5–10·5 μ; diam. fam. 19–25 μ.

Huilla. In uliginosis editioribus prope Humpata, Empalanca et Lopollo; May 1860. No. 15.

4. C. SCHIZODERMATICUS West in *Journ. R. M. S.* Dec. 1892, 742, t. x. fig. 61–63; in *Journ. Linn. Soc.* xxx. 275, t. xvi. f. 19 (1894).

Var. BADIO-PURPUREUS, var. n. Var. protoplasmate badio-purpureo; tegumentis pæne achrois, rarius stramineis, lamellis numerosissimis et ut in forma typica discedentibus. Diam. cell. sine teg. 5·5–12·5 μ; c. teg. 26–40 μ.

Golungo Alto. Inter *Scytonema insigne*, ad rupes madidas in umbrosis juxta rivum Coango enter Sange et Undelle; May 1856. No. 5. Ad rupes juxta riv. Coango, crustam viscoso-cartilagineam fusco-badiam formans. Collematis thallum fingens; June 1856. Nos. 139 and 140.

SUMMARY.

	Genera.	Species.
FLORIDEÆ :—		
I. Batrachospermeæ	1	4
II. Hildenbrandtiaceæ	1	2
CHLOROPHYCEÆ :—		
III. Œdogoniaceæ	2	16
IV. Ulvaceæ	1	2
V. Ulotrichaceæ	5	10
VI. Chroolepidaceæ	1	2
VII. Cladophoraceæ	2	4
VIII. Pithophoraceæ	1	1
IX. Temnogametaceæ	1	1
X. Zygnemaceæ	5	20
XI. Desmidiaceæ	15	139
XII. Vaucheriaceæ	1	1
XIII. Hydrogastraceæ	1	1
XIV. Palmellaceæ	13	22

Myxophyceæ :—		Genera.	Species.
XV.	Rivulariaceæ	3	6
XVI.	Sirosiphoniaceæ	3	9
XVII.	Scytonemaceæ	2	12
XVIII.	Nostoceæ	2	5
XIX.	Camptotricheæ	1	1
XX.	Vaginarieæ	4	10
XXI.	Lyngbyeæ	5	19
XXII.	Chamæsiphoneæ	1	1
XXIII.	Cystogoneæ	1	1
XXIV.	Chroococcaceæ	5	11
		77	300

P.S.—Mr. Hiern has kindly called our attention to a paper by Welwitsch in the *Journal of Travel and Natural History*, vol. i. pp. 22–36 (1868), entitled "The Pedras Negras of Pungo Andongo in Angola."

In this paper Welwitsch shows that the prolific growth of a subaërial alga is the cause of one of the main features of the country, as it gives such a peculiar aspect to the mountains that they are known as the "black rocks." He writes that it is "probably a non-described species of the prolific genus *Scytonema*, which in that situation during the rainy season generates and multiplies so rapidly that the upper portions of the mountains are covered with it in a very short time. . . . . Soon after the hot season has set in, at the end of May, when the horizon above the Presidium is generally clear and bright, the black plantlets begin to discolour with the intense heat. They gradually become dry and brittle until they peel off altogether by and bye, after which the rocks lose their sombre black aspect, and reappear in their natural grey or grey-brownish colour before the succeeding spring." Welwitsch named this plant *Scytonema chorographicum*, and gave a figure which is hardly characteristic. We have described it above as *Scytonema Myochrous* var. *chorographicum*. Mixed with it is a quantity of *Dichothrix gypsophila*. He states that "the wonderful growth of *Scytonema* in such immense quantities is not confined to the mountain ridge of the Presidium. . . . . In proof of this fact, I may refer to the damp sandy upper valley of the Cuanza River, where a species of *Scytonema* is abundant, frequently extending across the wide meadows, closely spread like a net over the soil, intergrown with the other herbs and smaller shrubs. Through its hygroscopic nature it eagerly absorbs the atmospheric moisture during the dewy nights, affording by this means a refreshing protection to the roots of many other and larger plants during the glowing heat of the following day. The growth and thriving of the numerous small phanerogamous plants in these places is conditional on the co-presence of the prolific *Scytonema*." This second "*Scytonema*" alluded to by Welwitsch is *Porphyrosiphon Notarisii*, one of the *Vaginarieæ*.

A parallel to this phenomenon is found on the sandy heaths of the south and some parts of the north of England. At the drier and hotter periods of the year, thickly-matted sheets of *Zygnema* *ericetorum* are to be found extending over wide patches of almost bare sand, round such plants as *Drosera*, *Carices*, &c. These interlacing masses have great absorptive capacity, greedily taking up water; it is also highly probable that they protect and render the growth of other plants more possible by regulating the moisture of the surface soil. It is interesting to note that *Zygnema ericetorum* is found intermixed in small quantity with the *Porphyrosiphon Notarisii* which covers such extensive areas in Angola.

Description of Plates.

All the figures are × 520, except fig. 2, t. 365, which is × 120.

Tab. 365.—Fig. 1–2. *Polychlamydum insigne*, n. gen. et sp. 3–6. *Proterendothrix scolecoidea*, n. gen. et sp. 7–8. *Œdogonium huillense*, n. sp. 9. *Closterium peracerosum* Gay, var. *æthiopicum*, n. var. 10. *Pleurotænium sparsipunctatum*, n. sp. 11. *Cosmarium æquinoctiale*, n. sp.

Tab. 366.—Fig. 1. *Micrasterias tropica* Nordst., forma. 2. *M. tropica* Nordst., var. *elegans*, n. var. 3. *M. tropica* Nordst., var. *crassa*, n. var. 4. *M. polonica* West & G. S. West. 5–6. *M. robusta*, n. sp. 7. *M. arcuata* Bail. var. *subpinnatifida*, n. var. 8. *Euastrum binale* (Turp.) Ehrenb. var. *angolense*, n. var. 9. *E. subdivaricatum*, n. sp. 10. *E. tetragonum*, n. sp. 11–12. *E. acmon*, n. sp. 13. *E. acmon* var. *clausum*, n. var. 14. *E. holoscherum*, n. sp. 15–16. *E. huillense*, n. sp. 17. *E. bimorsum*, n. sp. 18. *E. subinerme*, n. sp. 19. *E. subpersonatum*, n. sp. 20. *Cosmarium Baileyi* Wolle, var. *angolense*, n. var. 21. *C. Oocystidum*, n. sp.

Tab. 367.—Fig. 1. *Cosmarium colonophorum*, n. sp. 2. *C. Welwitschii*, n. sp. 3. *C. centrotaphridium*, n. sp. 4–6. Ditto, central scrobiculations. 7. *C. angolense*, n. sp. 8. *C. multiordinatum*, n. sp. 9. *C. tetrastichum*, n. sp. 10. *C. tetrastichum* var. *depauperatum*, n. var. 11. *C. mediogemmatum*, n. sp. 12. *C. ligoniforme*, n. sp. 13. *C. callistum*, n. sp. 14. *C. pseudotaxichondrum* Nordst., var. *africanum*, n. var. 15. *C. huillense*, n. sp. 16. *C. mucronatum*, n. sp. 17. *C. bilunatum*, n. sp. 18. *C. meteoronotum*, n. sp. 19. *C. trifossum*, n. sp. 20. *C. æthiopicum*, n. sp. 21. *C. maximum* (Börg.) nob., var. *minor*, n. var.

Tab. 368.—Fig. 1. *Cosmarium africanum*, n. sp. 2–3. *C. galeatum*, n. sp. 4–5. *C. Norimbergense* Reinsch, forma *elongata*. 6. *C. læve* Rabenh. var. *minimum*, n. var. 7. *C. affine* Racib. var. *africanum*, n. var. 8. *C. submamilliferum*, n. sp. 9. *C. Portianum* Arch. var. *orthostichum*, Schmidle. 10. *C. concentricum* W. B. Turn. var. *radiatum*, n. var. 11. *C. subtriordinatum*, n. sp. 12. *C. Libongense*, n. sp. 13. *C. repandum* Nordst. 14. *Xanthidium subtrilobum*, n. sp. 15. *X. cristatum* Bréb. var. *tropicum*, n. var. 16. *X. fasciculatum* Ehrenb. forma. 17. *Staurastrum huillense*, n. sp. 18. *S. scrobiculatum*, n. sp. 19. *S. micron* West & G. S. West, var. *angolense*, n. var. 20. *S. Gurgeliense* Schmidle, var. *tropicum*, n. var. 21. *S. cassidum*, n. sp. 22. *S. angolense*, n. sp. 23. *Penium variolatum*, n. sp. 24. *Closterium pusillum* Hantzsch, var. *subrectum*, n. var. 25. *Tetmemorus fissus*, n. sp. 26–31. *Ichthyocercus angolensis*, n. gen. et sp. 32–34. *Docidium trigeminiferum*, n. sp.

Tab. 369.—Fig. 1. *Staurastrum Welwitschii*, n. sp. 2. *S. Corbula*, n. sp. 3. *S. Corbula* var. *pulchrum*, n. var. 4. *S. actinotum*, n. sp. 5. *S. actinotum* var. *simplex*, n. var. 6. *S. pentateuchophorum*, n. sp. 7. *S. tridens-Neptuni*, n. sp. 8. *S. heteroplophorum*, n. sp. 9. *S. heteroplophorum* var. *latum*, n. var. 10. *S. Pseudohystrix*, n. sp. 11. *S. tripodum*, n. sp. 12. *S. egregium*, n. sp. 13. *S. cerastoides*, n. sp. 14. *S. crux-alternans*, n. sp. 15–16. *S. quadridentatum*, n. sp. 17. *S. areolatum*, n. sp.

Tab. 370.—Fig. 1–2. *Athroocystis ellipsoidea*, n. gen. et sp. 3–4. *Pyxispora mirabilis*, n. gen. et sp. 5–9. *Temnogametum heterosporum*, n. gen. et sp.; 7, scalariform conjugation between two specially cut-off cells; 8–9, lateral conjugation; *s*, *s'*, spores produced by scalariform conjugation; *l*, spore produced by lateral conjugation. 10–17. *Camptothrix repens*, n. gen. et sp.; 10–12, older filaments; 13–17, younger filaments. 18–19. *Cosmarium alatum* Kirch. var. *suboblongum*, n. var. 20. *Staurastrum elegantissimum* Johnson, var. *reductum*, n. var.

THE BERLIN RULES FOR NOMENCLATURE.

[The following is a translation of the Rules for the officials of the Royal Botanic Garden and Museum of Berlin which have been issued with the authority of the present staff.]

1.—The principle of priority for selection of the names of genera and species of plants holds good as a general rule; 1753/54 is regarded as the beginning of the establishment of priority.

2.—The name of a genus is, however, allowed to lapse if it has not been in general use fifty years, counted from the date of its establishment. If the name has, however, been revived in monographs or large floras as a result of following the "Laws of Nomenclature of the Year 1868," that name is to hold good.

3.—In order to obtain a similarity of form for the denoting of groups, we use the following endings:—The alliances are to end in *-ales;* the families in *-aceæ;* the subfamilies in *-oideæ;* the tribes in *-eæ;* the subtribes in *-inæ;* the endings are to be added to the root of the generic names, as *Pandan(us)-ales; Rumex Rumic(is)-oideæ: Asclepias, Asclepiad(is)-eæ; Metastelma, Metastelmat(is)-inæ; Madi(a) -inæ.**

4.—As regards the gender of names of genera, we go by correct grammatical custom in the case of classical words; with later names and barbarisms, the usage of the *Naturlichen Pflanzenfamilien* is maintained; changes in the endings or in the word are not, as a rule, to be permitted. Notorious faults in names taken from proper names must be corrected; for instance, *Rülingia* is to take the place of the *Rulingia* of the English, which has been imported by us.

5.—Names of genera which have become synonyms are better not used again in an altered sense for denoting a new genus or even a section of one.

6.—The rule of priority holds good for names of species, provided that no objections have been raised in a monograph against its retention. If a species is removed to another genus, it must retain its oldest specific name.

7.—The author who first named the species, although in another genus, is always to be acknowledged, and his name is therefore to be placed in brackets before that of the author who has removed the species into another genus; thus, *Pulsatilla pratensis* (L.) Mill. If an author has himself placed his species in another genus, the bracket is omitted.

8.—As regards the mode of writing specific names, that followed by Linnæus has been introduced into the Botanical Garden and Museum. This is to be still observed, and we therefore write all species-names with a small letter, except those derived from the names of persons and those which are substantives (names of genera in many cases still, or at least formerly, in use); for example—

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* Some exceptions, as *Coniferæ, Cruciferæ, Umbelliferæ, Palmæ,* remain correct.

Ficus indica, *Circæa lutetiana*, *Brassica Napus*, *Solanum Dulcamara*, *Lythrum Hyssopifolia*, *Isachne Büttneri*, *Sabicea Henningsiana*.

9.—In the formation of genera- and species-names from proper names *a* is added for the genus to those names ending in a *vowel* or *r*; *i* is added for the species. Thus, *Glazioua* (from Glaziou), *Bureaua* (from Bureau), *Schützea* (from Schütze), *Kernera* (from Kerner), and *Glazioui*. *Bureaui*, *Schützei*, *Kerneri*; if the name ends in *a*, we change this vowel for euphony to *æ*; thus from *Colla* is formed *Collæa*; in all other cases *ia* or *ii* is added to the name; thus, *Schützia* (from Schütz), *Schützii*, &c. This applies also to names ending in *us*, as *Magnusia*, *Magnusii* (not Magni), *Hieronymusia*, *Hieronymusii* (not Hieronymi); in the same way are formed the adjectival forms of proper names, as *Schützeana*, *Schütziana*, *Magnusiana*. It is no longer customary to make a difference in the use of the genitive and adjectival form.

10.—In the formation of composite Latin and Greek substantives or adjectives, the vowel which is between the two roots is used as a connecting vowel, in Latin *i*, in Greek *o*; *menthifolia* is correct therefore, not menthæfolia.

11.—We recommend the avoiding of such names as would produce tautology, such as *Linaria Linaria* or *Elvasia elvasoides*; in the same way it is allowable to dispense with priority when it is a question of names which have arisen through obvious errors of geography on the part of the author; such as *Asclepias syriaca* L. (which comes from the United States), *Leptopetalum mexicanum* Hook. & Arn. (from the Liu-Kiu Islands).

12.—Hybrids are denoted by connecting the names of the parents with ×, and preserving the alphabetical order of the species-names; as *Cirsium palustre* × *rivulare*; in the position of the names no notice is taken as to which is male and which female. The double nomenclature for hybrids is not considered admissible by us.

13.—Manuscript names have not under any circumstances a right of consideration, even when they appear on printed labels in exsiccata. This holds good for gardeners' names and for names in sale catalogues. For the recognition of any species a printed diagnosis is required, which may of course appear on an "exsiccata label."

14.—An author has no right to alter the name of a genus or species once given by him, except for very important reasons, as in Rule 11.

[While agreeing in the main with the principles laid down in the above Rules, the following observations occur to us:—

1.—With regard to the date of the beginning of priority, we are not clear why the double date "1753/54" is given.

2.—This rule seems to us open to serious objection. What is meant by "general use"? How many citations are necessary to constitute such use, at what intervals of time, and by what class of author? What is a "monograph"—is it of an order, a genus, or a species? and what flora is to be considered a "large" one? How is it to be known in all cases whether the reviver of a name in such a work has so acted "as a result of following the Laws of 1868"?

4.—What is intended by a "notorious fault in names taken from proper names"? Do *Stillingia*, *Goodenia*, *Richardia* and *Cinchona* come in this category?

6.—The retention of the oldest specific name was not consistently practised by Linnæus, although he generally retained it. *Ethulia divaricata*, for example, had been previously called by him *Artemisia minima;* and on placing *Leucadendron oleæfolium* Berg. in the genus *Protea*, he named it *P. pubera*. As we have often stated in this Journal, we object to this rule because it would necessitate in many cases the formation of a new combination, and so encumber synonymy. The Berlin authorities themselves, under Rule 11, contemplate various exceptions to this rule.

7.—We think the practice imposed by Rule 7 is unnecessary and cumbrous.

10.—This Rule is far too simple; it does not provide for cases where the second root-word begins with a vowel, and other exceptions might be taken.

Ed. Journ. Bot.]

EXTRACTS FROM BOTANICAL EXCHANGE CLUB REPORT, 1895.[*]

By William H. Beeby, F.L.S.

Caltha palustris L. var. *procumbens* Beck. Marshy ground, Loch Insh, near Aviemore, v.-c. 96, 15th June, 1894. Mr. G. C. Druce remarks:—"Certainly an intermediate *C. palustris* and *C. radicans*, but not so near the latter plant as some forms I saw in Glen More. As I have stated, I do not think *C. radicans* is specifically distinct from *C. palustris*, and I am not certain how *radicans* can be separated from var. *procumbens*."—A. Somerville. In the *Scottish Naturalist*, 1888, p. 210, I gave my reasons, founded on experiment, for considering that the only constant distinction between *C. palustris* and *C. radicans* is to be found in the rooting stem of the latter plant, all the other characters being common to both plants. The most natural arrangement accordingly appears to me to be the following:—

Caltha palustris L.
 Subsp. I. *C. vulgaris* (sensu lat.)
  varr. ad lib.
 ,, II. *C. radicans* (sensu lat.)
  varr. ad lib.

This is practically the arrangement adopted by Dr. Huth in his *Monographie* (1891), where *C. palustris* is divided into two main sections, characterized respectively by the rooting and non-rooting stem. But Dr. Huth letters his varieties continuously through these two sections, so that, when reduced to catalogue form, his primary subdivision entirely disappears, which I think a disadvantage. Forster's original plant is simply a very rare form of the subspecies ii., just as the form of subspecies i. with similar leaves is extremely rare. To continue to make the leaf-form a specific or subspecific character is most artificial, and Watson well remarked of Forster's plant (*Cybele*, i. 92) that it may be retained as a book species "in compliment to its author," but that it is no species in nature. I should not hesitate, therefore, to call Mr. Somerville's plants one, or rather several, of the numerous forms of *C. radicans*. The var. *procumbens* Beck was published in Dr. Huth's Monograph, and the leaves, which are not figured, are described as "cordate-reniform, crenate or subentire." I scarcely think, therefore, that any of Mr. Somerville's plants can be exactly this variety, if the description is accurate; one of them has rather coarsely dentate leaves; in all the leaves are either longer than broad, or about equally long and broad, the latter of course coming nearest to the description. I cannot bring myself to think that Dr. Huth would have used the term "cordate-reniform" except to describe a leaf which was appreciably broader than long, and I think that, speaking generally, the leaves of Mr. Somerville's plants should be described as cordate-orbicular. The above remarks, so far as they specially refer to the plants under consideration, are made on the supposition that they belong to the rooting subspecies. This appears to me probable; but as persistently non-rooting prostrate forms do occur, I regard it as a matter of opinion and not of fact. Mr. Somerville has shown me a plant with rooting stem from Loch Insh, gathered on the same day; but the plants sent do not show the character.—W. H. Beeby.

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[*] Issued June 5th, 1897.

Barbarea intermedia Boreau. Shirley, Derby, 17th May, 1895. The same plant as was commented on in *Bot. Exch. Club Rep.* 1889, p. 244, and 1890, p. 283. Growing here, this plant becomes more luxuriant, and the pods are somewhat less adpressed to the rachis. It is a plant of cultivated ground, not of brookbanks and waysides as *B. vulgaris* is; its upper leaves are pinnatifid, its petals are less than twice as long as the sepals, its pod is short-pointed. Specimens agreeing very closely with my plant were gathered in Surrey by Messrs. Marshall and Wolley Dod, and confirmed as *intermedia* by Svante Murbeck, but pronounced to be *B. vulgaris* in the *Rep. of the Watson Club*, 1893-4, and 1894-5, Appendix; so that there seems some variance as to this species between British and foreign connoisseurs of the genus.—Wm. R. Linton. Among some Barbareas of Mr. Marshall's, which I sent some time ago to Docent Murbeck, there were several which were named by him *B. intermedia*. The plant mentioned by Mr. Linton is no doubt the one from a bank near Thursley, Surrey; this much resembles Mr. Linton's plant, the others do not. The Shirley specimens now sent are immature, and descriptions of the fruiting raceme are scarcely applicable to plants in that condition, because the relative proportions of the pods change greatly as they ripen. I do not see the affinity with *B. vulgaris*, and think that this plant differs chiefly from our ordinary *B. præcox* when in a similar stage of growth, in the pods not being incurved. Barbareas, however, seem to be liable to aberrations of this sort, and I think that ripe fruit will probably show Mr. Linton's plant to be a form of *B. præcox*. As the latter plant is still cultivated, it is very likely that there are several forms of it of garden origin. Besides this, Jordan describes three species which are now treated as varieties in Camus' *Catalogue*.—W. H. Beeby.

Cochlearia danica L., var. Walton Gaol, Lancashire, April and October, 1895. Having had two different opinions regarding this plant (see *Report*, 1893, p. 401, and 1894, p. 464), I thought a further supply might prove of interest to the members.—J. A. Wheldon. I do not see any reason for calling this a variety; it is an ordinary annual form of the plant. Syme (*Eng. Bot.* iii.) doubted whether this species ever bore angulated root-leaves, and my own limited experience in growing the plant from seed would have led me to the same conclusion; but Mr. Wheldon's specimens show that the radical leaves are occasionally slightly angulated. When the plant assumes the biennial habit, however, the apex of the rootstock usually branches at the end of the first season's growth, and each of these heads produces a tuft of ivy-like leaves; but these are not the true root-leaves. In the *Report* for 1894, p. 464, Mr. Marshall speaks of a plant from the above locality as being "untypical" for *C. danica* on account of the "stalked stem-leaves," &c. I do not know the meaning of this, unless we are to infer that the specimen in Linn. Herb. has sessile stem-leaves. If so, while it may be technically the type, it would certainly be a very uncharacteristic example of the species as it usually occurs in nature.—W. H. Beeby.

Malva moschata L. var. *Ramondiana* Gren. & Godr. *Fl. Fr.* i. 289, where it is described as having "feuilles toutes entières, dentées." It occurred in a gravelly heathy field near Tilehurst, Berkshire, August, 1895, and from its bright-coloured flowers and nearly entire leaves was a conspicuous plant. *Malva moschata* is common in the vicinity, but more frequently as the type—the var. *laciniata* Gren. & Godr. *l. c.*—"toutes les feuilles divisées en lanières étroites." Occasionally the var. *intermedia* Gren. & Godr. *l. c.* occurs; this has "feuilles caulinaires divisées en lanières étroites; les radicales réniformes crénelées." I have not seen the var. *Ramondiana* elsewhere. In France it appears to be rare, since Gren. & Godr. only record it from the Bagnères de Luchon, where Ramond's Herbarium is preserved, which I had an opportunity of inspecting a few years back.—G. Claridge Druce. "A very interesting variety of *Malva moschata* L. This certainly must closely approach var. *Ramondiana* Gren. & Godr., but I only know this from the description, which is 'feuilles *toutes* entières, dentées.' The upper leaves here are certainly lobed."—E. G. Baker.

Rosa stylosa Desr. var. *pseudo-rusticana* Crépin. Chetnole, Dorset, 22nd June, 1895. I send specimens of this well-marked rose from one of two new Dorset localities in which I have seen it in fair quantity in recent years, the other being the borders of Piddle Wood, near Sturminster Newton. I think it extremely probable that the form has been produced by hybridization between *R. systyla* Bast. and *R. arvensis* Huds., though now in some districts (as in the

Teign Valley, S. Devon) it is so abundant as to seem to propagate itself by seed. In the hundreds of luxuriant and abundantly flowering bushes that I have seen I can recall only a single flower that was not pure white, and that might merely have developed a pinkish tinge when fading. The flowers of *R. systyla* are usually pink, though occasionally of as pure a white as those of *R. arvensis*. In habit *R. pseudo-rusticana* is just intermediate between these two. —W. Moyle Rogers.

Campanula rotundifolia L., forma. Limestone, S. of Lough Mask, Co. Mayo, Ireland, 15th July, 1895. A pretty and distinct-looking plant when growing. Mr. H. Groves writes to me:—"The lesson of these specimens seems to me that leaf-characters are of very little value in this species. The larger specimens seem to answer fairly well to var. *lancifolia* of Mertens and Koch." To myself the question of size appears of small importance, depending as it does upon greater or less moisture, at any rate in the present case.—Edward S. Marshall. "Growing the various forms side by side, under equal conditions, seems to be the only means of really finding out whether they be merely states due to situation, or varieties. I suspect that a very considerable number of our catalogue varieties would, if subjected to this test, disappear from the lists of those who discriminate between the state and the variety. I have gathered similar forms in Surrey, near Haslemere, and elsewhere; but have doubted whether any are really varieties.—W. H. Beeby.

Syringa vulgaris L. Near Egremont, Cumberland, July, 1895. The common lilac has established itself in hedges about 1½ miles east of Egremont very considerably. It forms the hedge for about twenty yards not far from Ulcoats Mill. Between Cote Close and Moss Dalts farms it occupies the hedges in many parts to the exclusion of the thorn for spaces of from five to twenty yards in length in different fields. It has the appearance of having been bird-sown.—Joseph Adair.

Gentiana germanica Willd. A small-flowered form abundant in a chalk-pit at North Sydmonton, Hampshire, this year, 21st September, 1896. The plants varied considerably in character, and in several cases there was a difficulty in distinguishing them from robust forms of *G. Amarella* L.—A. B. Jackson. I could not refer these specimens either to *G. germanica* or to *G. Amarella*, and as certain features suggested a hybrid origin, I sent examples to Dr. von Wettstein, who, after closely examining the plant, agrees in thinking it a hybrid between the two above species. He arrives at this conclusion because:—"1. It is completely intermediate, morphologically, between the two species named. 2. The sterility of the pollen. I could, however, only examine one flower, as the others were going to seed. This one contained 48 per cent. of abortive pollen-grains. 3. The small number of fully-developed seeds. I examined three capsules, of which one contained 56 per cent., the second 97 per cent., and the third 88 per cent. of evidently abortive seeds." Dr. Wettstein adds that for a complete determination it would be necessary to know whether the plant grows in company with its putative parents. Mr. Jackson has promised to investigate this point, but I may mention that I have seen *C. germanica* Willd. from the locality. (See *Report* for 1892, p. 379.)—W. H. Beeby.

Potamogeton sparganiifolius Laestad. River Maam, Co. Galway, 5th July, 1895.—W. A. Shoolbred. "I doubt much this being the true plant of Laestadius, notwithstanding the late Prof. Babington's opinion that it was so (cf. *Journ. Bot.* 1872, 228). My specimens, gathered by Laestadius himself, differ in many points; and I think we must, anyhow at present, use Syme's name—*P. Kirkii*—until a careful study of the plants *in situ* is made. In his 'Loca parallela plant.,' in a note on *sparganiifolius*, Laestadius observes, '*Sparganio natanti* e longinquo simillimus. Folia natantia sæpe desunt, tumque nemo sane divinaret, tam propinquum esse *P. natanti*, ut dubium sit an ex illo tuto separari possit' (p. 242 (1839))."—Ar. Bennett. "This resembles the Scandinavian plant in the submerged leaves, but differs in the branched stem and in the shape and areolation of the floating leaves; it might be placed under *P. fluitans* as a variety, but I would prefer to name it *P. Kirkii* Syme. Possibly it may be *polygonifolius* × *natans*."—A. Fryer.

Potamogeton undulatus Wolf. = *P. perfoliatus* × *crispus*. Sixmile River, above Templepatrick, Co. Antrim, 10th Aug. 1894. Grows in dense masses in the deeper parts of the river, with abundant fruiting spikes, but no fertile drupes. In shallows of a tributary stream it creeps amongst stones, but in that situation produces only leaves.—S. A. Stewart. "There is a considerable degree of uncertainty as to the precise form which Wolfgang described as *P. undulatus*. On such evidence as I have been able to obtain it seems probable that original specimens gathered and named by him are in part *P. prælongus* × *crispus*, and in part *P. crispus* × *perfoliatus*. M. J. Baagöe has examined the typical specimens in the St. Petersburg Herbarium, and assures me that this is *crispus* × *prælongus;* a specimen in my herbarium, gathered by Wolfgang, seems to me to be the same as the Stirling plant collected by Messrs. Bidston and Stirling, which is certainly *crispus* × *perfoliatus*. Mr. Baggöe inclines to think that none of our British specimens equal Wolfgang's plant, and has sent me drawings of stem-sections of the type and of my var. *Cooperi*, and of the supposed parents of the two forms, which strongly support his views. I think Mr. Stewart's plant is equal to my var. *Cooperi*, and perhaps had better be named *Potamogeton* × *Cooperi* = *crispus* × *perfoliatus*."—A. Fryer.

Alopecurus utriculatus Pers. Meadow, near Oxford, 13th July, 1895. This grass was growing in fair quantity in a meadow in the neighbourhood of Oxford, in May, 1895. It was not an isolated patch, but thinly scattered about over a space of about 150 yards, and apparently well established. On inquiry from the farmer who occupies the land it proved that he had used a great deal of foreign hay in the year 1893, when the English hay-crop almost entirely failed owing to the drought. The seeds which became separated in the process of chaff-cutting were scattered about the field in question to improve the next year's crop. The hay was said to have come from Canada. In many of the spikes the lower spikelets had become fleshy and semi-transparent. I do not know whether this *Alopecurus* is an indigenous Canadian grass; if not, it is a remarkable instance of a plant having twice crossed the Atlantic, and become established through human agency—in one case, if not in both, unintentionally.—L. V. Lester. "Correctly named."—E. Hackel. This is a plant of continental Europe, and is not recorded by Macoun as yet introduced to Canada.—W. H. B.

Weingaertneria canescens Bernh. Sand dunes by the sea, between Morar River and Arisaig, Scotland, July, 1895.—Fredk. Townsend. The occurrence of this plant in the above locality, which comes within v.-c. Westerness, naturally suggested some enquiry into its recorded occurrence in Ayrshire. So far as I have been able to trace, it is first mentioned by Watson for the latter county in *Top. Bot.* ed. 1, 1874, where it appears in square brackets. Doubtless this record was obtained from the *Botany of Ayrshire* (1872), a list which I have been able to consult through the kindness of Mr. A. Somerville. The record there given is "Dalrymple and Coylton; James Smith in *New Statistical Account of Scotland*." The Rev. David Landsborough (*in litt.* to A. Somerville, 10th December, 1895) writes as follows:—"List furnished to *New Stat. Acc.* by James Smith in 1837. He was in regular correspondence with Sir W. Hooker. J. S. also furnished list of plants of parish of Maybole; all the plants in Maybole list are, I believe, correct, except *Vicia sylvatica*, which is written *Lathyrus*—doubtless a clerical error, as former plant occurs in abundance in locality given." The Rev. D. A. Boyd writes (*in litt.* to Ar. S., 10th Dec. 1895), "Smith's parishes are both inland rural parishes, with neither large towns, ballast-heaps, nor tracts of sea-shore." This is all that I have been able to learn concerning the Ayrshire record. In the course of these enquiries it came incidentally before me that *Elymus* and other grasses had several times been sown on the sands about Arisaig; and although Mr. Somerville, Mr. Symers M. Macvicar, and others used their best endeavours to ascertain the truth respecting the *Weingaertneria*, the question of its nativity was still a matter of doubt until Mr. Townsend finally ascertained that it had been sown by Mr. Eneas R. Macdonnell, of Morar, who states (*in litt.* to F. Townsend, 31st May, 1896), "The fact of discovering the plant at Toigall has recalled facts to my memory which leave no doubt on my mind that the *Weingaertneria* is not indigenous, but was introduced direct here, and not by accidental admixture." Mr. Townsend informs me that the grass occurs in plenty on the sand-hills, and it is somewhat disappointing that we cannot claim it as a native here, especially as it is said to occur in Norway in a slightly higher latitude. Although I have given some details of the Ayrshire record, there does not now appear to be any particular reason to expect that it will be confirmed.—W. H. Beeby.

SHORT NOTES.

Salix Hybrids.—I believe that *S. Lapponum* × *repens* was added to the British list on the faith of leaf-specimens gathered by me beside the Lochsie Burn, in Glen Shee, in 1892, which Dr. Buchanan White agreed with me in believing to be this. The plant has been in cultivation ever since, but did not flower until this year: it proves to be *S. Lapponum*, pure and simple. Another supposed hybrid (*S. Arbuscula* × *herbacea*) from Ben Chaisteil, Argyle, is merely *S. Arbuscula* with unusually rounded leaves. A third cultivated willow, from the same Argyle station, I now refer with much confidence to *S. Arbuscula* × *nigricans;* it is fairly intermediate between the parents, with which it grew.—Edward S. Marshall.

Polygala austriaca. — On June 10th the Toynbee Natural History Society found *Polygala austriaca* in a new station, on the downs N.E. of Otford, Kent.—G. L. Bruce.

Hieracium rigidum Hartm. in Worcestershire.—Mr. Frederick J. Hanbury has kindly looked at some hawkweeds collected in a railway-cutting near Upton-on-Severn on July 1st, and determines them to be a form of this species. The record is, I believe, new for Worcestershire, but, although the plant occurs at this station in considerable quantity, I cannot feel sure that it may not be a recent introduction.—Richard F. Towndrow.

Nitella translucens in Bucks.—I recently gathered this handsome species in the ponds at Burnham Beeches, where it grew in great quantity. I also gathered on Stoke Pogis Common *Sagina subulata* and *Cerastium quaternellum*, and near Taplow *Filago apiculata* and *Lepidium ruderale*. In the ponds at Burnham Beeches I noticed an *Utricularia*, which I believe is *U. major* Schmidel (*U. neglecta* Lehm.). *U. vulgaris* and *U. intermedia* (see *Phytologist*, n.s. v. 170 (1861)) have been reported from the same locality, but in the latter case it is probable that a mistake was made. Until flowers are procured, there must be an element of doubt in my determination of the species as *U. major*, but the aspect of the plant is quite similar to *U. major* as it occurs in Berkshire.—G. C. Druce.

Carex elongata in Hampshire.—I gathered a tuft or two of this plant near the Blackwater, between Finchampstead and Jouldern's Ford. It was rather more plentiful on the Berkshire side of the stream near Thatcher's Ford. *Roripa amphibia* is plentiful there; it is not recorded for the northern portion of Hampshire in Mr. Townsend's Flora of that county. *Carex elongata* appears to be a new county record.—G. C. Druce.

Note on Anthericopsis. — It is perhaps worth while calling attention to a point arising from a communication by Prof. Engler in his recently-issued "Nachtrag" to parts ii.–iv. of *Die Naturlichen Pflanzenfamilien*. In the *Pflanzenwelt Ost-Afrik*. Theil C, p. 139, he describes a new genus of *Liliaceæ*, which he calls *Anthericopsis*, and places between the two very closely-allied genera *Anthericum* and

Chlorophytum. In the "Nachtrag" to the *Pflanzenfamilien*, p. 69, *Anthericopsis* is assumed (I think rightly) to be identical with *Gillettia*, a genus of *Commelinaceæ* subsequently described by me in this Journal for 1896, p. 55, t. 355, on a species of *Aneilema* which seemed to show differences sufficiently striking to allow of generic separation. Prof. Engler, admitting my view of its position, now places *Anthericopsis* next to *Aneilema*, distinguishing it by its regular calyx and corolla, and equal ovary chambers. He makes no mention of the difference in the pollen to which I called attention, that of the new genus being round and echinulate, while in *Aneilema* it is oblong or kidney-shaped. On the other hand, a character is introduced into the diagnosis both in the *Pflanzenwelt* and the *Pflanzenfamilien* which does not exist in the material examined by me; the petals are described as shorter than the sepals, whereas in my specimens (see fig. and description in *Journ. Bot.*) they are appreciably larger, nearly ¾ in. as compared with 7 lines. This discrepancy may be due to the withered condition of the petals in the specimens examined by Engler, as it is difficult to restore these very delicate structures in *Commelinaceæ* to their original size and shape. Or it may be that Engler's *Anthericopsis Fischeri* (in *Pflanzenwelt*, p. 139) is not identical with my *Gillettia sepalosa* (*Journ. Bot.* l. c.), and that there are two, and not a single species only, *viz. Anthericopsis Fischeri* Engl. (*Pflanzenwelt*, l. c.) and *A. sepalosa*, non *A. sepalosa* Engl. (syn. *Aneilema sepalosum* C. B. Clarke in DC. *Monogr. Phan.* iii. 202; *Gillettia sepalosa* Rendle in *Journ. Bot.* l. c.). The leaves of *A. Fischeri* are described as *circ. 1–1·5 cm. longis, 2 cm. latis*, but this measurement for the length is obviously wrong.—A. B. Rendle.

NOTICE OF BOOK.

Flora Capensis: being a Systematic Description of the Plants of the Cape Colony, Caffraria, and Port Natal (and neighbouring Territories) by various Botanists. Edited by W. T. Thiselton-Dyer, C.M.G., C.I.E., LL.D., F.R.S., Director, Royal Gardens, Kew. Published under the authority of the Governments of the Cape of Good Hope and Natal. Vol. VI. Hæmodoraceæ —Liliaceæ. London: Reeve. 8vo, pp. x, 563: 24s. net.

Botanists are to be congratulated on having at last in their possession a volume of the work which was intrusted to Dr. Dyer exactly a quarter of a century ago, and which has ever since remained in abeyance. It is issued as vol. vi. of Harvey and Sonder's *Flora*, but considering the extension of place, which now includes the area between the Tropic of Capricorn and the Ocean, and the consequent accession of material, it may more accurately be regarded as the first volume of a new work. It is certain that when the enumeration has proceeded backwards as far as the *Ericaceæ*, the earlier volumes which come down to that order will have to be rewritten. But at the present rate of progression this is a matter not likely to trouble any botanist now living.

The whole of the present volume is from the pen of Mr. J. G. Baker, whose name is a guarantee that the British Museum Herbarium has been duly consulted. We are fortunate in having, from the pen of their author, this collection of the numerous papers dealing with South African monocotyledons with which he has enriched botanical literature. The proportion of new species described in the body of the book is not large, but an appendix (also by Mr. Baker) contains numerous novelties which have come to hand during the progress of the volume through the press.

Mr. Baker being thus the author of the book, the omission of his name from the title-page is to be regretted. Cataloguers will be compelled to enter the volume under the name of the editor, without even a cross-reference to the man who has done the work. It is not easy to see on what ground this can be justified, while it is certain that it could have been avoided. If it be urged that the Director of the Royal Gardens at Kew is *ex officio* responsible for all the publications that issue therefrom, it may be replied that this *Flora* is "published under the authority of the governments of the Cape of Good Hope and Natal," and, moreover, that Dr. Dyer's name appears nowhere in connection with the eccentric little *Bulletin of Miscellaneous Information*, which is an official publication of Kew Gardens. It can hardly be in accordance with an official rule, for no such course is adopted with the British Museum publications—the author's name, for example, stands alone on the title-page of the Catalogue of Welwitsch's African Plants, although Mr. Murray contributes an official preface. It cannot be said that the appearance of Mr. Baker's name—even were he only a contributor to, and not the author of, the volume—would be unprecedented; for the five pages (out of 711) in which Dr. Dyer enumerated the Central American *Cycadaceæ* were held sufficient to justify the insertion of his name on the title-page of vol. iii. of Mr. Hemsley's Botany of the *Biologia Centrali-Americana*. We trust that in future volumes some means will be taken to recognize the actual authors on the title-page of the *Flora*.

Dr. Dyer has been fortunate in having obtained so much assistance that it is a little difficult to see where his editorship comes in. Mr. Baker has written the book: Mr. N. E. Brown has distributed the localities under the different regions, and Mr. Bolus has revised his work; Mr. C. H. Wright "has greatly helped in reading the proofs"—a task for which one would have thought Mr. Baker competent. The Editor has, however, contributed a preface to the volume, as well as a prefatory note to each part, and the first contains some useful information regarding the more recent of the collections on which the book is based. The twenty-five years' delay in continuing the *Flora* is attributed to the Director's official duties and the expansion of South Africa, and we are glad (speaking from a botanical standpoint) that these have so far been modified as to allow something to be done. After this there is hope for the *Flora of Tropical Africa* and the *Guide to Kew Gardens*, which, as will be seen in another part of this Journal, have once more formed the subject of questions in the House of Commons. The Enumeration of Chinese Plants will also, we trust, recover from the blight which seems to fall upon so many of the Kew literary undertakings. As we remarked not long since, no greater testimony to the remarkable ability and energy of Sir Joseph Hooker can be given than that which is afforded by the fact that, while Director of Kew Gardens, he found time for most of his work on the *Genera Plantarum*, as well as for numerous important memoirs and monographs and an annual Report of the Gardens and Herbarium, for which the existing *Bulletin* is in no sense a substitute.

In our notice of part ii. of this volume, we took exception to the brackets in which (in the body of the book, but not in the index) the authority for each specific name is placed; and we trust that the Editor will see his way to abandon this unnecessary and even misleading practice. Uniformity even in such small matters is desirable, and, considering the numerous changes which have been introduced into this volume, the fact that brackets were employed in the earlier part of the work is hardly sufficient to justify their retention here. The Kew use of a small initial for adjectival forms of proper names is, we are glad to see, condemned by the Berlin rules, as well as by custom and common sense. A new feature is the introduction of the phrase "no specimen at Kew" at the end of some of the descriptions, which seems to justify the inaccurate inference that specimens of all the other plants are to be found there. Some of the abbreviations employed are unusual—such as "Konig and Sims' Ann."; and we cannot think it right to attribute the species established in Bentham & Hooker's *Genera Plantarum* to either author individually, as is done when "Acidanthera pauciflora Benth. Gen. Plant. iii. 706" is cited. Some exception may, we think, be taken to the citation "Eriospermum dissitiflorum Schlechter" for a new species, without some addition of "MS." or "in Herb.," for Mr. Schlechter does not appear to have written the description. These of course are small matters, but from an editor in Dr. Dyer's position we have a right to expect something like perfection. At any rate we have to thank him—on the principle of "better late than never"—for giving his imprimatur to Mr. Baker's work, and we trust that he may live to edit many more volumes of the *Flora Capensis*.

ARTICLES IN JOURNALS.[*]

Annals of Botany (June).—J. B. Clifford, 'Physiological properties of a Myxomycete Plasmodium.'—E. Sargant, 'Formation of sexual nuclei in *Lilium Martagon:* II. Spermatogenensis' (2 pl.). — G. Massee, 'Monograph of *Geoglosseæ*' (2 pl.). — D. T. Gwynne-Vaughan, 'Polystely in *Primula*' (1 pl.). — D. H. Scott, 'New instances of spinous roots' (2 pl.). — R. H. Biffen, 'Functions of latex.' — H. M. Ward, '*Peziza aurantia.*' — Id., 'The Ginger-beer Plant.'

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[*] The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Bot. Centralblatt (Nos. 24–26). — P. Kunth, 'Zur Biologie der Blüten.' — (Nos. 24–27). K. Friderichsen, 'Zur Kenntniss der *Rubi corylifolii.*'—E. Levier, 'Über falsche Priorität und Krückennamen.'—(Nos. 28, 29). M. Britzelmayr, 'Materialien zur Beschreibung der Hymenomyceten.' — (Nos. 29, 30). F. Kuhla, 'Ueber Entstehung und Verbreitung des Phelloderms.'

Bot. Gazette (June 28). — R. Thaxter, 'Observations on *Myxobacteriaceæ*' (2 pl.). — J. M. Coulter, C. J. Chamberlain, & J. H. Schaffner, 'Life-history of *Lilium philadelphicam*' (8 pl.). — H. J. Webber, 'Peculiar structures in pollen-tube of *Zamia*' (1 pl.).— A. F. Foerste, 'Curious leaves.' — L. M. Underwood, 'Species of *Botrychium.*'

Bot. Zeitung (July 16). — E. C. Hausen, 'Biologische Untersuchungen über Mist bewohnende Pilze.'

Bull. de l'Herb. Boissier (July). — A. Franchet, 'Les *Saussurea* du Japon.'—C. Müller, 'Symbolæ ad Bryologiam Jamaicensem.'— A. Cnabert, 'Noms patois et emploi populaire des plantes de la Savoie.' — J. Freyn, 'Orientalische Pflanzenarten.'—F. Bucholtz, 'Stellung der Gattung *Meliola*' (1 pl.). — F. Arnold, 'Flechten auf dem Ararat.'—F. Kränzlin, *Eulophia Junodiana* et *E. aurea*, spp. nn. —A. Cogniaux, *Momordica fasciculata*, sp. n.

Bull. Soc. Bot. France (xliii, pt. 9: June). — M. Gandoger, 'Plantes nouvelles pour la Flore Espagnole.' — A. Magnin, 'Les *Arum vulgare* et *italicum* dans le Lyonnais.' — P. Vuillemin, 'Les anachronismes parasitaires.' — E. A. Finet, *Oreorchis Fargesii* et *O. unguiculata*, spp. nn. (2 pl.). — M. Cornu, *Cuscuta Lehmanniana*. —E. Malinvaud, 'Les *Euphrasia* de la Flore Française.'

Bull. Torrey Bot. Club (June 29). — J. B. Ellis & B. M. Everhardt, 'New N. American Fungi.'—P. A. Rydberg, 'Rarities from Montana.' — Id., '*Antennaria dioica* and its N. American allies.'— A. M. Vail, 'The genus *Philibertella*' (= *Philibertia* auct.).— A. A. Heller, 'Plants from Nez Percés County, Idaho' (2 pl.).

Erythea (May 31). — W. L. Jepson, '*Boschniakia strobilacea*' (1 pl.).

Gardeners' Chronicle (June 19). — *Dendrobium Victoriæ Reginæ* Lober, sp. n. — (July 10). '*Campanula Balchiniana* ×' (fig. 5).— (July 17). *Epidendrum Stanhopeanum* Kränzl., sp. n.

Journal de Botanique (June 16, July 1).—A. Franchet, '*Isopyrum* et *Coptis*' (cont.).—C. Sauvageau, 'Les algues marines du Golfe de Gascogne' (cont.). — (June 16). E. Perrot, 'Sur certaines Gentianées aquatiques.' — (July 1). L. Gander, *Euphorbia Peplus* et *E. peploides* (= one species).

Journ. Linn. Soc. (xxxiii, no. 228; July 1). — G. D. Haviland, 'Revision of *Naucleeæ*' (4 pl.).—J. H. Burrage, 'Adhesive discs of *Ercilla volubilis*' (1 pl.).—W. G. P. Ellis, 'A *Trichoderma* parasitic on *Pellia epiphylla*' (2 pl.). — W. C. Worsdell, 'Transfusion-tissue in leaves of gymnospermous plants.' — A. J. Ewart, 'Evolution of oxygen from coloured Bacteria.'

Malpighia (fasc. iv.–v.). — P. Baccarini, 'Sulla *Genista aetnensis* e le Genista junciformi della flora Mediterranea' (6 pl.: concl.).— C. Avetta, 'Flora crittogamica della provincia di Parma.' — L. Gabelli, 'Sopra un caso assai interesante di sinfisi fogliare.'

Nuovo Giorn. Bot. Ital. (July).—C. Müller, 'Bryologia Provinciæ Schen-si Sinensis.'—A. Palanza, 'Osservazioni botaniche in terra di Bari.'— A. Del Testa, 'Flora vascolare delle Pinete di Ravenna.'— E. Baroni, 'Sopra due forme nuove di *Hemerocallis* e sopra alcuni *Lilium* della Cina.' — L. Nicotra, 'Sul genere *Fumaria* e su alcune forme dello stesso.'—M. Massari, 'Briologia Pugliese e Sarda.'

Oesterr. Bot. Zeitschrift (July). — J. Hoffmann, 'Zur Kenntniss der Gattung *Odontites*' (1 pl.: cont.). — F. Pax, 'Neue Pflanzenarten aus dem Karpathen' (cont.). — J. Bornmüller, *Calamagrostis Lalesarensis* Torg. & Bornm., sp. n. — G. Richen, 'Zur Flora von Vorarlberg' (concl.).

BOOK-NOTES, NEWS, &c.

In the House of Commons on June 28th, Mr. Alfred Billson asked the First Commissioner of Works (1) whether steps can be taken to publish without further delay a new edition of the Guide to the Royal Gardens, Kew, which has been out of print for several years, seeing that similar questions had been asked in the House in 1891, 1892, 1893, and 1895, and that in 1892 the then First Commissioner of Works stated that the Guide was almost ready, and that it was hoped to issue it during the summer; (2) whether it is intended to continue the issue of the monthly Bulletin of Miscellaneous Information in connection with Kew Gardens; (3) whether he is aware that the number for December last has not yet appeared; (4) whether only one number has been issued this year; and (5) whether any progress has been made with the continuation of the Flora of Tropical Africa, the completion of which was authorized by the Treasury in 1891, on the understanding that one volume would be published every two years; or whether, owing to the non-fulfilment of this condition, the authorization had lapsed; and in that case will it be renewed? The First Commissioner of Works (Mr. Akers-Douglas) said in reply: "Owing to great pressure of work at Kew, the Director seems unable to make rapid progress with the edition of the general Guide to the Gardens, beyond the preparation of guides to various departments, ten of which have been recently published and are on sale. The answer to paragraphs 2 and 3 of the hon. Member's question is in the affirmative; only one number has been issued this year (January). A new number of the Flora of Tropical Africa will be ready next year. Instructions were last autumn issued to the Director to have the work proceeded with as quickly as possible, and an additional assistant was given him that he might have more time for its supervision."

At the meeting of the Linnean Society on June 17th, Dr. D. H. Scott, F.R.S., exhibited original preparations by Prof. Ikeno and Dr. Hirase, of Tokio, Japan, illustrating their discovery of spermatozoids in two Gymnospermous Phanerogams, namely, *Ginkgo biloba* and *Cycas revoluta* (cf. *Bot. Centralblatt*, Bd. lxix. nos. 1–2, 1897, and *Annals of Botany*, June, 1897). The slides showed the spermatozoids while still in the pollen-tube, before the commencement of active movement. In the case of *Ginkgo* one section showed the two male generative cells, closely contiguous and enclosed in the pollen-tube. The general structure resembles that in many other Conifers at the same stage, e. g. *Juniperus virginiana* and *Pinus sylvestris* (Strasburger, *Hist. Beiträge*, iv. pl. 2). In *Ginkgo*, however, each generative cell showed a distinct spiral coil, situated in each cell, on the side remote from its neighbour. Another preparation of *Ginkgo* showed a series of sections across the micropyle, passing through a pollen-tube and its generative cells, the plane of section being in this case approximately parallel to the surface of contact of these two cells, through which four of the sections passed. In the two terminal sections of this series the spiral coil was clearly shown, consisting of about three windings. The spiral is connected with the nucleus of the cell, but whether it is itself of nuclear or cytoplasmic origin is not certain. In the preparation from *Cycas revoluta*, several pairs of generative cells were shown; in some cases the pollen-tube enclosing them was intact. The spiral coils in some of the generative cells were surprisingly clear, consisting of about four windings. A distinct striation was visible in connection with the coil, probably indicating the presence of the numerous cilia described by the Japanese discoverers. The facts admit of no other interpretation than that given by these authors, namely, that in both *Ginkgo* and *Cycas* each generative cell gives rise to a special spermatozoid; the latter by its own movements (actually observed by Dr. Hirase in the case of *Ginkgo*) no doubt travels from the end of the pollen-tube to the female cell.

At the same meeting Mr. Miller Christy, F.L.S., read a paper on *Primula elatior* Jacq. in Britain. He remarked that this widely-distributed continental plant, though figured accidentally in *English Botany* in 1799, was not really detected in Britain till 1842, to which time the totally distinct hybrid oxlip (*P. acaulis* × *veris*) was, by British botanists, confused with and mistaken for it, as is still frequently the case. In Britain, *P. elatior* occupies a sharply-defined area, divided by the valley of the Cam, with only two outlying localities, so far as Mr. Christy could ascertain. This area covers the two most elevated and unbroken portions of the boulder clay district, the loams and gravels of the river-valleys and the chalk being entirely avoided. The boundary-lines (some 175 miles in length) which had been traced by Mr. Christy with precision were, in consequence, very sinuous. They enclosed together about

470 square miles, over which area the oxlip flourishes in immense abundance in all old woods and some meadows; while the primrose (which grows all around) is entirely absent. Along the dividing line between the two, which is very sharply defined, hybrids are produced in great abundance. On the other hand, the cowslip (which grows both around and throughout the oxlip-area) very rarely hybridizes with it. Mr. Christy believed that the primrose was, in this country, gradually hybridizing the oxlip out of existence. He then noticed a rare single-flowered variety of *P. elatior*, which he proposed to call var. *acaulis*, and several aberrations, showing upon the screen photographic views of these and of the hybrids, as well as a map of the distribution of the oxlip in Britain.

Sir H. H. Johnston's attractive volume on *British Central Africa* contains a carefully drawn-up list of the plants known to occur in the region (including Cryptogams), compiled by Mr. I. H. Burkill. No new species are described, and there is no bibliography—a somewhat regrettable omission, easily explicable, however, from the necessity of limiting the space taken up by the list, which already occupies over fifty pages. The region has been divided into four sections—1. Shire Highlands; 2. Nyasa-Tanganyika plateau; 3. Extreme west; 4. Upper Zambezi; and the distribution of each species is indicated. Occasional slips are inevitable in lists of this kind; one such may be suspected in *Luffa ægyptiaca*, which is included only on faith of a plant collected by Buchanan, a specimen so named in the Kew list of his collection being *Momordica foetida*. But the work is carefully and, so far as we have been able to test it, very completely done.

We have received a batch of accessories compiled by Mr. H. N. Dixon upon the basis of his *Handbook of British Mosses*. These are, a "*Handbook*" *Catalogue*, a "*Handbook*" *Label-List of British Mosses*, and an *Alphabetical Index to Genera* (Eastbourne: V. T. Sumfield. London: John Wheldon & Co.). They cost but a few pence each, and afford a readily consulted and almost complete list of our mosses, with the species numbered consecutively throughout: and the student, whether he uses Mr. Dixon's *Handbook* or not, will find these lists of great assistance to him in his work, be it in the arrangement of his herbarium or the negociation of exchange.

The second number of Notes from the Botanical School of Trinity College, Dublin, contains three papers by Mr. H. H. Dixon —"On the *rôle* of osmosis in transpiration," "On the osmotic pressure in the cells of leaves," and "On the physics of the transpiration current." Prof. Perceval Wright contributes various notes on the College Herbarium.

We are glad to note that botany received due recognition in the distribution of the Jubilee honours, in the promotion of Sir J. D. Hooker to the Grand Cross of the Star of India.

Dr. Dyer contributes a page about Kew Gardens to the *Pall Mall Magazine* for August.

MONOGRAPH OF THE BRITISH SPECIES OF EUPHRASIA.

Prefaced by an Epitome of Prof. Wettstein's Views on the Development and Distribution of the European Species.

By Frederick Townsend, M.A., F.L.S.

Introduction.

The genus *Euphrasia* has of late years received such an amount of attention, and the localities of the various forms and species have been noted to such an extent, especially throughout Europe and Asia, that as a result it has been found that the species are remarkably restricted to areas of distribution. It is still more remarkable that the areas of closely-allied species are not found to intersect or overlap. Among such species are *E. Tatarica* Fisch., *E. pectinata* Ten., *E. stricta* Host. They are closely allied, but their areas are distinct, and do not overlap. *E. Salisburgensis* Funk. is closely allied to *E. Illyrica* Wetts., but the former does not occur within the area of the latter. On the other hand, take *E. minima* and *E. stricta*, *E. nemorosa* and *E. borealis*. The first two are remotely allied, but the area of the first is found within the area of the second. The latter two are also remotely allied, but the area of the one intersects the area of the other. Intermediate forms may and do occur, but they are the exception and not the rule. The botanist is therefore forced to recognize that certain forms have become and are more or less stable, and to such an extent that they may be treated as permanent enough to constitute and be reckoned and described as species.

In this paper I propose to preface a description of the species indigenous to the British Isles by notes on the various organs, and on the history of the evolution, formation, and distribution of the species as given in Prof. Wettstein's monograph of the genus. No one has done more towards the elucidation of the genus than Prof. Wettstein, whose monograph exhibits great sagacity, great ability, united with the most careful and wide observation. He has cultivated many of the species, has sifted records, examined herbaria, and elaborated the synonymy. He has shown that while that close observer M. Jordan recognized several distinct species which western botanists were not acquainted with, he gave new names to some which had already been recognized and named by earlier botanists. The adoption of M. Jordan's names by recent observers has led to considerable confusion, and contributed to induce many to believe that the species so run into one another as to make it impossible and even a waste of time to enumerate and describe them. As instances I may refer to three marked species to which M. Jordan gave new names, but which Prof. Wettstein has shown to have been already known and named. These are—*E. majalis* Jord. = *E. pectinata* Tenor., *E. ericetorum* Jord. = *E. stricta* Host., *E. puberula* Jord. = *E. Tatarica* Fisch.

I have done my best to put the reader in possession of the salient features of Prof. Wettstein's views, and of his methods of reasoning, but I would refer botanists to the monograph itself for the consideration of the subject in all its bearings. We have only eleven or twelve indigenous species, but to explain the phytogeny of these I find it necessary to review most of the European species with which our own are so intimately connected. This will more easily be understood when it is taken into account that we have in our indigenous species representatives of all the European groups adopted by Prof. Wettstein.* The monograph is written in German, and many may not have access to it, hence my excuse for an attempt to deal with this somewhat difficult subject.

Part I.

Morphology, Evolution, and Formation of Species.

In the first paragraph of the monograph Prof. Wettstein gives us an insight into his method of working. He there states that it is by deep study of the areas of distribution of individual forms that a knowledge of the history of their evolution is to be obtained, and later on he says again that the best way of gaining an insight into the history of the development of the forms of a polymorphous group of plants is to study the geographical range of each individual form. Having sufficient data as regards the European forms, he has found it possible to define their areas of distribution. With regard to extra-European forms he has not attempted a similar study, as we do not as yet possess sufficient data for the purpose.

For the determination of species Prof. Wettstein has had special regard to their phytogeny or race-history, as well as to their stability and distinctness of character; he notes that the development of species has been so varied that they are neither equal in rank nor in age; *i. e.* that their development has occurred in different ways and at different epochs. A feature in the monograph is that varietal names are not multiplied. The way in which the species vary is noticed, and the varietal names given by authors in their descriptive works are alluded to and sifted.

Elementary Organs; the Epidermis and its Processes.—Prof. Wettstein estimates the character of the hairs to be of great specific importance in this genus; much more so than I had deemed them to be. They are found on the stem, the leaves, the bracts, the calyx, the corolla, and the capsule; they are of two kinds, *viz.* glandular and eglandular. The eglandular hairs may consist of one or of several cells placed end to end, and the hairs gradually narrow to a point; they are found on the stem, leaves, bracts, calyx, corolla, and capsule. In many cases where they may seem to be absent it will be found that they are one-celled, and so reduced in size as to be perceptible only through a lens. The glandular hairs are also of two kinds. They may consist of one cell tipped by a gland, or of several cells placed end to end, the last tipped by a gland, and this distinction is of great importance. The third kind of process is of little specific importance; it consists of shield-like sessile glands found in all the species, especially on the under sides of the leaves and bracts.

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* It is a matter of considerable satisfaction that the groups proposed by me in a former paper on *Euphrasia* (*Journ. Bot.* 1884, pp. 161–168), though more numerous, naturally fall into those adopted by Prof. Wettstein.

The Root.—When the seed germinates, the primary root soon emits smaller secondary roots in acropetal order, which at first, though near together, are at regular distances apart, but later on other roots intervene, which destroy any appearance of regularity.

Both the main root and the secondary ones of all the annual species are, taken as a whole, small, and occupy but a small area. Hairs on the roots are few; a ring of hairs is produced on the young radicle soon after germination, and there are a few hairs at the root-tips and on the haustoria. The character of the organs termed haustoria is of special interest. They appear on the secondary roots soon after the seed has germinated, but later on may occur also on the main root; they consist of a special discoid-like exogenous growth, which attaches itself to the roots of the plants on which the species are parasitic, and from which nourishment is derived. The roots are usually those of grasses and sedges, and unless these are present haustoria are not produced, growth becomes arrested for lack of parasitic nourishment, and though the plant can grow stem, root, and a few leaves, it seems unable to produce flowers and fruit, and eventually perishes. L. Koch has written on the haustoria of *Euphrasia* in Pringsh. *Jahrb. f. Wiss. Bot.* xxii. 1891, and references to other observers on the parasitic growth of *Rhinanthaceæ* will be found in Prof. Wettstein's *Monograph*, p. 11. Prof. Wettstein has traced the growth of cultivated *E. Rostkoviana* on the roots of *Poa nemoralis* and *P. annua*, and on *Agrostis vulgaris*, on which plants the parasite thrived; he could not succeed in bringing the parasite to perfection on *Holcus mollis* or on *Cyperaceæ*. He was only once able to trace the parasitic growth of *E. Salisburgensis* on the roots of a *Carex*, and in culture he succeeded in bringing plants to perfection on the roots of *Carex alba*. I myself traced the growth of the haustoria of *E. Scotica* on the roots of *Cyperaceæ;* the species were *Carex flava*, *C. panicea*, *C. fulva*, *C. glauca*, and *C. pulicaris*, but I was unable to trace on which of these the plant was parasitic.

The Stem is usually branched, but in some species it is simple. It is simple or branched in all British species. The position and the wealth of the branches on the stem is of specific value. The stem is green, or is often tinged with purple or red; it is more or less clothed with jointed recurved hairs, and in some species with glands and glandular hairs; the character of these hairs and glands has already been treated of. The branches are subopposite; they are simple, as in *E. brevipila*, *E. gracilis*, *E. curta*, &c., or compound, as in *E. nemorosa*. (*E. Foulaensis* seems to be usually unbranched.)

Leaves.—The cotyledons are, in all the species, simple, small, rotund or egg-shaped, and entire. There is a remarkable difference between the greater or less hairiness of these; in *E. Rostkoviana*, which is a very hairy species, the cotyledons are hairless or nearly so. The leaves are usually opposite, though the upper pairs are often not strictly so; they are always toothed, and are usually narrower than the bracts, and have a narrower base; the lowest pair usually have but one tooth on either side, the next pair two teeth, the number of teeth increasing in the upper series, the uppermost pair usually having the same number as the lowest pair of bracts. The teeth of the leaves and bracts vary in number, position, form, and furniture, and afford valuable specific characters. The teeth of the leaves are usually blunter than those of the bracts, and the greater the number of teeth the broader the base of the bract. The number of teeth varies from one to ten. The edges of the leaves and bracts are very frequently recurved. The upper bracts are commonly more plentifully furnished with glandular hairs in the glandular species. A secretion of carbonate of lime is frequently found on the upper surface of the leaves and bracts; I have seen it abundantly in *E. Scotica*. The bracts are morphologically and anatomically similar to the leaves. Prof. Wettstein is of opinion that the species with fewer teeth represent the older forms.

THE FLOWERS are always solitary in the axils of the bracts. The peduncle in all the European species is so short as to merit the term subsessile. In some extra-European species, as in *E. Zelandica* and *E. cuneata*, the flowers are distinctly stalked.

THE CALYX is always four-toothed, the teeth varying little in form, except in breadth, length, and termination; they are more or less acute, and they are often awned. In some species the calyx increases in size by growth after flowering. It does so in *E. latifolia*, and in *E. pectinata*, &c., the furniture of the calyx is very similar to that of the bracts. The position of the fifth or abortive tooth is probably next the axis.

THE COROLLA.—This organ varies considerably in size, though not much in form, in our native species. Prof. Wettstein places the European species in three groups, the first two of which—*Grandifloræ* and *Parvifloræ*—are distinguished by the comparative size of the corolla. In the latter group there are species which have an intermediate-sized corolla, and the physiological character of the flowers of these differs from that of the rest of the *Parvifloræ* as well as from all the species in the *Grandifloræ*, a difference which will be noticed later on. The third group—*Angustifoliæ*—all have a small corolla. The corolla is always tubular, and is excluded in the large and included in the small flowering species. The tube is curved or straight. The upper lip is two-lobed, the under lip is three-lobed. The lobes of the upper lip are more or less united below, and form a protective hood over the anthers; a portion of the upper and outer margin of the lobes is more or less recurved in all the European species; the apex of the lobes is erose or 2- or 3-dentate. The lobes of the lower lip are usually emarginate; the five divisions represent five 3-nerved leaves. Prof. Wettstein calls attention to the additional nerve in the angles of the divisions of the corolla, which he thinks is a provision against the tearing of the corolla by insect visitors. White, red, blue, and violet, in various shades, are the colours which are exhibited in the corolla, the throat and lower lip being usually furnished with a yellow spot, which doubtless acts, as do the three darker-coloured nerves of the divisions, as a guide to visiting insects. The outer surface of the upper lip is always furnished with fine-jointed, many-celled hairs extending to the tube, where the hairs are stronger and decurved. The lower lip is also usually provided with similar hairs, together with a few shortly stalked glandular ones. The tube is internally furnished with stronger one-celled hairs curved at their tips; they doubtless serve to prevent the intrusion of undesirable insect visitors, who would steal the honey without assisting in cross-fertilization. The hairs of the corolla offer no valuable specific characters.

In some species the corolla-tube lengthens considerably after the opening of the flower; this growth and the size of the corolla as a whole afford valuable specific characters.

The Stamens are always four in number; the anthers are situated under the hood of the corolla; the filaments are inserted in the throat of the corolla; they are curved outwards. The two anterior stamens are longer than the posterior; the anther-cells are distinct and parallel, the anterior ones are spurred in all the British species.

The Style and Stigma.—The style is long and filiform, and arises from the apex of the ovary; at the time of flowering it is bent or curved under the hood of the corolla. The stigma is small, disk-like, undivided, and papillose.

Fertilization.—In the section *Grandifloræ* the flowers are proterogynous, the style is straight from the bend under the hood to the apex and projects beyond the upper lip even before the flower has perfectly expanded; the dehiscence of the anthers has not yet taken place, so that cross-fertilization (zenogamy) is ensured. By the time the tube of the corolla has lengthened and brought the stigma nearer to the anthers, the former has become withered and discoloured. In the section *Parvifloræ* some species with intermediate-sized flowers have a similar provision to that in the *Grandifloræ*, but other species, also with intermediate-sized flowers, have the style curved under the hood and over the anthers, and from that downwards so as to bring the stigma in front of the former. The flowers in both are proterogynous, so that cross-fertilization can take place in an early stage, but as these flowers, being smaller, are less attractive to insects, the anthers dehisce earlier than in the *Grandifloræ*, and the papillæ of the stigma have not become withered, but are still capable of fertilization from contact with the anthers of its own flower if zenogamy has not taken place. ' In the smaller-flowered species, as in *E. gracilis* and *E. Salisburgensis*, the stigma is ripe for fertilization at the time of anthesis, but the anthers open at the same time, the style is curved at the end so as to bring the stigma immediately over and in contact with the anthers, so that autogamy is insured, though zenogamy is not necessarily excluded. Prof. Wettstein remarks that these small-flowered species occur in northern regions and in the Alps, localities in which insect life is less abundant, and the flowers being less conspicuous and their nectaries smaller, they are thus provided for autogamy. Müller gives the following names of insects he has observed to visit *E. Rostkoviana* and *E. stricta*:—Bombus agrorum; B. pratorum; Apis mellifica; Nomada lateralis; Systrechus sulphureus; Syrphus sp.; Melithreptus tæniatus. Prof. Wettstein has observed the following visiting *E. Rostkoviana*:—Bombus pratorum; Melanostoma barbifrons; Halictus cylindricus.

The Nectary is minute in all the species, and is situated at the back of the ovary on the anterior side.

The Fruit consists of a two-celled many-seeded capsule in all the European species; in form it is elliptic or ovate, truncate or rounded, entire or emarginate, and tipped with the base of the style; its length with respect to the calyx varies in different species, and consequently offers specific characters. It is usually furnished with straight and erect long or short hairs at the sides and apex, and with additional shorter adpressed hairs. The dehiscence is loculicidal and two-valved.

The Seeds are numerous in the European species; they are reduced to two in each cell in some Extra-European species; they are pendulous, longitudinally furrowed, and narrowed at the apex; they present no satisfactory specific characters. With regard to the dispersion of the seeds, as there is no special provision for this in the seeds themselves, Prof. Wettstein considers that the feet of birds are effective as agents in their dispersion; also the elasticity of the withered or dead stem and branches is potent for dispersal, when these are moved by the wind or by passing animals. The seeds being very light, both wind and water are also doubtless powerful agents for dispersal.

As regards any marked difference in anatomical structure between the species, Prof. Wettstein remarks that he finds greater anatomical differences in the same species when under different conditions of locality, environment, &c., than are to be found between different species. The anatomical character of the stems of the perennial species naturally differs from those of the annual species.

The Evolution or Formation of Species.

A chapter of the Monograph is devoted to the question of the origin of the species, and here it is stated that the method of induction has been too much pursued, whereas that of deduction has been too little considered. As important factors in the formation of species in the genus *Euphrasia* Prof. Wettstein gives the following:—1. Hybridity; 2. Varied Climatic Conditions; 3. Arrest of Periods of Vegetation. He does not exclude other factors in the production of new forms or species, and he alludes to the survival of the fittest as one of these. We will take in order the three factors given above.

1. Hybridity.—A hybrid may become at once a new and constant species or an intermediate form. The result may be that the offspring will be intermediate between the parents, with greater

likeness to one or the other, or it may be different from either. Or, two hybrids may originate a form which cannot be placed in the genus. As instances of species which are the result of hybridity he gives the following:—*E. Portæ; E. Stiriaca; E. pulchella; E. drosocalyx* (= *E. capitulata?* Towns.).

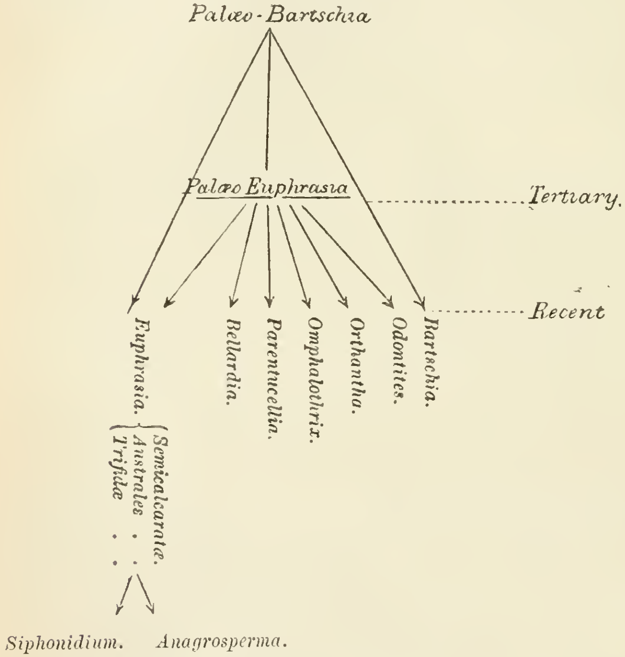
2. VARIED CLIMATIC CONDITIONS.—The spreading of a species over areas with different climatic conditions or climatic changes within one and the same area may produce new forms or species. The fact that species are very gradually changed by altered climatic influences, and that new species are very slowly formed by them, throws great light on the subject of species-building by these means. The changes are brought about by a power which can further develop or can degrade existing organs, but cannot create new ones. And herein lies the great difference between the change caused by hybridity and that caused by climate; in the latter case the change is not brought about by an innate power in the plant itself, and only fixed by altered climatic influences and environment, but the change is virtually caused by these latter factors, and not by the selecting power in the battle for existence. I believe I rightly interpret the Professor's meaning to be that natural selection does not originate, though it is a power in fixing, the new forms.

3. THE REPEATED AND CONTINUED ARREST OF THE GROWTH of a species will originate new forms. As an instance of change brought about by this means, Prof. Wettstein refers especially to the relation between *E. montana* and *E. Rostkoviana*. The ancestor of these species was a summer-blooming one; in long herbage the plant could bloom with difficulty, being on the one hand smothered by grass, on the other being cut down by the scythe; hence only abnormally early blooming plants or abnormally late blooming ones could come to perfection and ripen seed. *E. montana* is the representative of the early, and *E. Rostkoviana* of the late-blooming forms. *E. tenuis* and *E. brevipila*, *E. cærulea* and *E. curta*, have a similar relation to each other. Prof. Wettstein instances an analogous case given by Wallace and termed by him *Saison dimorphismus*, differing, however, in that the change here takes place in one generation, whereas many generations have been required to produce the change in *Euphrasia*. Prof. Wettstein proposes the term *Saison-generations dimorphismus* for the former, and *Saison-Artdimorphismus* for the latter. Prof. Wettstein does not definitely allude to the influence of variety in soil, chemical or otherwise. Remarkable instances are given of change induced by such influences in Dr. Eugenius Warming's *Lehrbuch der Oekologischen Pflanzengeographie*, page 63 (Germ. ed., 1896). Sadebeck, beginning in 1871, cultivated *Adiantum Serpentini* and *A. adulterinum* for sixteen generations, and these species reverted to *A. Adiantum-nigrum* and *A. viride*.

Though it may seem that the members of this polymorphous genus are distributed without order, it must be remembered that without doubt the earlier members were in the first instance fewer, more closely related, and more distinctly grouped; but changes of climate within the areas, and the extension of forms into areas with different climatic conditions, blotted out these more sharply bounded areas by the multiplication of forms and the breaking up and separation of areas.

The connection between the genus *Euphrasia* and several of the genera of *Rhinanthaceæ*—*Bellardia* All., *Odontites* Pers., *Orthantha* Benth., *Parentucellia* Viv. (all included in *Bartschia* by Hook. and Benth.), and *Omphalothrix* Max.—points to an ancestor from which these have been derived. This ancestor Prof. Wettstein names *Palæo-Bartschia.* The following scheme exemplifies this:—

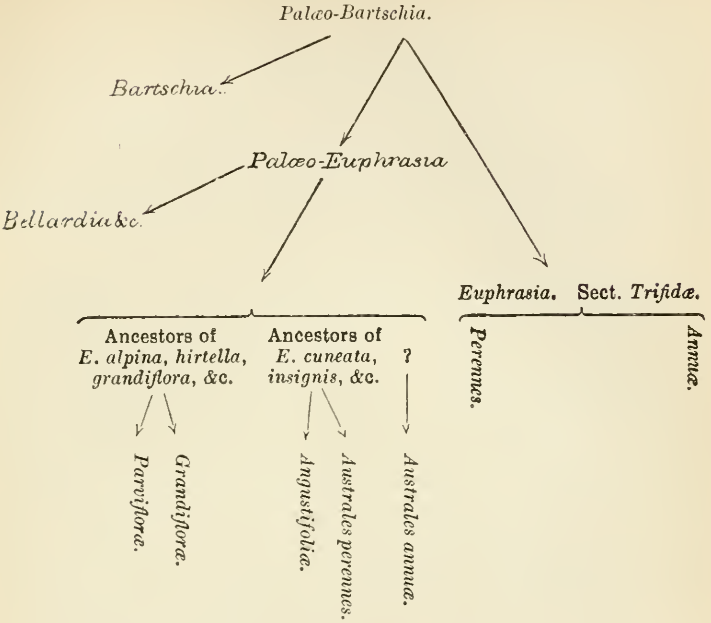
Scheme I.


Palæo-Bartschia
Palæo Euphrasia
Tertiary.
Recent
Euphrasia.
Semicalcaratæ
Australes
Trifidæ
Bellardia.
Parentucellia.
Omphalothrix.
Orthantha.
Odontites.
Bartschia.
Siphonidium.
Anagrosperma.

The ancestors of these genera represented a polymorphic genus occupying a wide and isolated area, but this area was diminished, probably during the post-Tertiary epoch, by the low temperature of the ice age, and hence most of these genera have their home now in the Mediterranean and Central Asiatic region. It will be seen that the genus *Euphrasia* of to-day is sharply divided into sections —the *Eueuphrasia* section on the one hand, and the *Trifidæ* section on the other; Section I. being further divided into two subsections —I. *Semicalcaratæ*; II. *Australes.*

There are evidences to prove that the *Australes* and *Semicalcaratæ* had common ancestors. *E. cuneata*, a perennial, in New Zealand, and *E. insignis*, an annual, in Japan, are morphologically allied. On the other hand, the sections *Parviflora* and *Grandifloræ* are only remotely allied to *E. insignis.* Scheme II. will exemplify this.

SCHEME II.

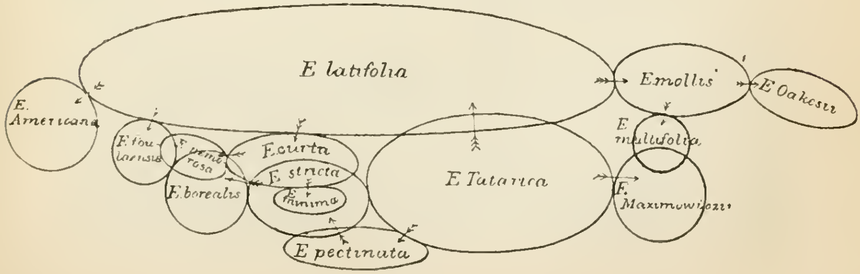

Palæo-Bartschia.
Bartschia.
Palæo-Euphrasia
Bellardia &c.
Euphrasia. Sect. Trifidæ.
Perennes.
Annuæ.
Ancestors of E. alpina, hirtella, grandiflora, &c.
Ancestors of E. cuneata, insignis, &c.
?
Parvifloræ.
Grandifloræ.
Angustifoliæ.
Australes perennes.
Australes annuæ.

Subsection I. includes all the European species; it is divided into three groups, *viz.* Group I. *Parvifloræ;* Group II. *Grandifloræ;* Group III. *Angustifoliæ;* and as all these are represented by our indigenous species, I propose to take into consideration each group in order.

SECTION I., EUEUPHRASIA; SUBSECT. I., SEMICALCARATÆ; GROUP I., PARVIFLORÆ.

This group includes thirty-three species, of which nine are British. These thirty-three species are spread over Northern Europe, Asia, and America. The adjoining Plan shows the distribution and connection of the most important of these species at a glance.

PLAN SHOWING AREAS OF DISTRIBUTION.


E latifolia
E. Americana
E. foularensis
E. nemorosa
E. curta
E. stricta
E. minima
E. borealis
E. pectinata
E. Tatarica
E. mollis
E. Oakesii
E. multifolia
E. Maximowiczii

The species may be divided into three series. Series I. comprises *E. pectinata*, *E. Maximowiczii*, *E. Tatarica*, *E. stricta*, *E. pumila*, *E. borealis*, which, among other distinctive characters, have comparatively larger flowers. Series II. comprises species having comparatively smaller flowers; they are, *E. cærulea*, *E. nemorosa*, *E. multifolia*, *E. Americana*, *E. curta*, *E. occidentalis*, *E. Canadensis ?*, *E. latifolia*, *E. Foulaensis*, *E. mollis*, *E. Oakesii*, *E. gracilis*, *E. Liburnica*, *E. Cebennensis*, *E. minima*, *E. Tatræ*, *E. Willkommii*, *E. Scotica*. Series III. comprises species which have a morphologically more isolated position; they are, *E. hirtella*, *E. grandiflora*, *E. Jaeschkei*, *E. Regelii*, *E. drosocalyx*, *E. pulchella*, *E. micrantha*, *E. brevipila*, *E. tenuis*.

We will first take into consideration SERIES I. In the PLAN we see how isolated are the areas of *E. pectinata*, *E. stricta*, *E. Tatarica*, and *E. borealis*, all nearly related. We see the area occupied by *E. Maximowiczii* distinct from that of *E. Tatarica*, but the one touching the other. *E. pumila* and *E. stricta* are similar examples. The formation of all these species Prof. Wettstein considers to have been due to climate, and not to hybridity. The wide distribution of *Parvifloræ*, from Japan to Spain, points to a time very far back, *viz.* to the tertiary epoch, when a group of species of which the present are representatives, altered or unaltered, occupied an extended area, but reduced in dimension in Europe by the post-tertiary ice age. *E. Tatarica* occupies a similar area; it extends in Asia to 70°, but has a reduced area in Europe. If we suppose *E. Tatarica* to have been the parent species, much light will be thrown on the connection and distribution of the whole group. In tertiary times it extended from East Asia to Europe. During the glacial epoch its northern range was diminished, but later on, *viz.* after the last glacial period, it advanced again northwards. During this latter epoch climatic influences split the species into three—*E. pectinata* in the Mediterranean region, *E. stricta* in the Baltic, and *E. Tatarica* in Central and East Asia from the Black Sea to the Inkolan Mountains, occurring also in France, Italy, and Switzerland; while in the Pacific, in the Japanese Islands and opposite coast a new and allied species, *E. Maximowiczii*, was evolved. The special climate of England and Scotland and adjoining islands brought *E. borealis* into existence. The isolated position of *E. Tatarica* in Italy, France, and Switzerland betokens a former wider range. The present southern range of *E. pectinata* and its absence on the north coast of the Adriatic point to a northern ancestor driven southwards by severity of climate. Thus, at the end of the tertiary epoch some of the members of the group we have been considering had been formed, and some have since been formed and fitted to the areas which they inhabit, and their rank as species is equal; these species are, *E. pectinata*, *E. Tatarica*, *E. Maximowiczii*, *E. stricta*, *E. pumila* (this last derived from *E. stricta* at a later date), *E. borealis*. The ancestor of these Prof. Wettstein proposes to name *E. palæo-pectinata*.

Series II. contains eighteen species (see p. 334), characterized as having a comparatively smaller corolla. The relationship of these is more complicated. Their areas have a wider extension east and west and nearer to the North Pole, but they do not reach so far south, circumstances which point to their representatives having an extension, since the tertiary period, over the northernmost portion of the area occupied by the genus, diminished in the north during the ice age, but later on again spreading northwards and occupying isolated and usually mountain areas. It is self-evident that the ancestral species must have been widely distributed in a northern and circumpolar area. The existing species *E. latifolia* now alone occupies such an area, and it is morphologically and geographically related to the species under consideration. From a parent type similar to *E. latifolia* sprung, in connection with the dispersion over Europe which followed the post-tertiary ice age, *E. curta* and *E. nemorosa*, also the two local species *E. occidentalis* and *E. Cebennensis;* after the same dispersion there remained on the mountain ranges of Middle and South Europe progenitors from which, fitted to local circumstances, sprung *E. Willkommii*, *E. minima*, *E. Tatræ*, and *E. Liburnica*. In Northern Europe, in a climate similar to that of the high mountain ranges of South Europe, *E. Scotica*, so similar to *E. minima*, had its rise. In the Shetland Isles, and the Faroes, &c., we have *E. Foulaensis*, so nearly related to *E. latifolia*. In the extreme west we have *E. Americana*, so nearly related to *E. nemorosa*. In the extreme east of the area of *E. latifolia* we have *E. mollis*, *E. multifolia*, and *E. Oakesii*, similarly derived.

As regards *E. gracilis* and *E. cærulea*, we must seek some other origin than that of climatic influence. It has been already observed under the head of "Evolution or Formation of Species" that *E. cærulea* and *E. curta*, though their areas are now isolated, have an analogous origin to that of *E. Rostkoviana* and *E. montana*, and there are reasons in favour of a similar origin as regards *E. gracilis*. This species occurs within a portion of the area occupied by *E. nemoralis* and *E. curta*, and it flowers earlier than either of these; on the other hand, it is morphologically distinct from both. The conclusion Prof. Wettstein has come to is that *E. gracilis* already existed at an earlier epoch and before *E. nemorosa* and *E. curta* were differentiated, and that it was the ancestor of a late-flowering species from which both *E. nemoralis* and *E. curta* had their origin. The ancestor of Series II. Prof. Wettstein proposes to call *E. palæo-nemorosa*.

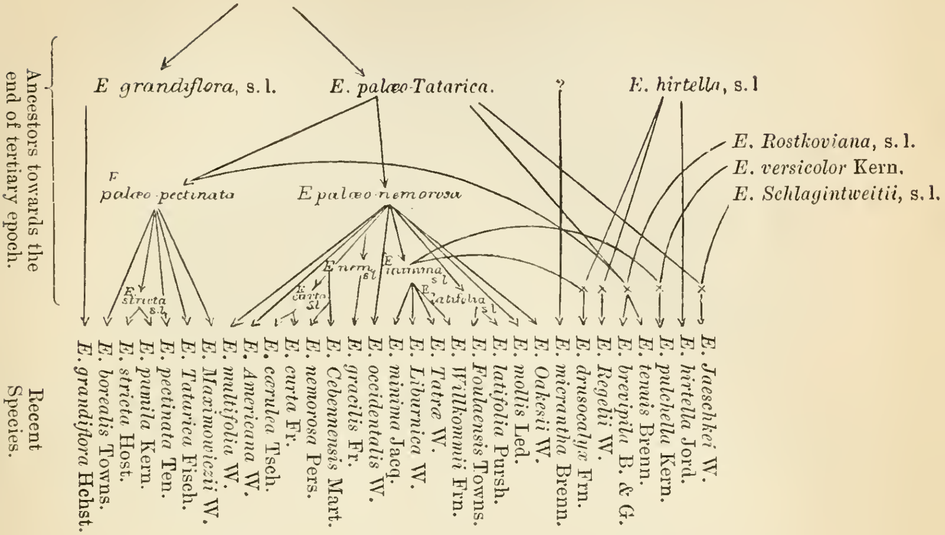
Reverting to *E. latifolia*, whose ancestor we have learnt to look upon as the parent of the series under consideration, we see that it is morphologically and geographically allied to *E. Tatarica*, and consequently to the ancestor of the *E. pectinata* series, which we have named *E. palæo-pectinata*. Now the old type of *E. Tatarica* had a very wide range, and we may rightly conclude that it was the origin of the greater number of the species in the group *Parvifloræ*. This type Prof. Wettstein proposes to name *E. palæo-Tatarica;* hence this more ancient form was the parent of the two series we have been considering, *viz.* Series I. *E. palæo-pectinata*, and Series II. *E. palæo-nemorosa;* the former comprising species with flowers comparatively larger and fitted both for cross- and self-fertilization, but for the former alone at the time of the opening of the flowers; the latter comprising species with a more northern range, and with flowers comparatively smaller and fitted for self-fertilization, but in which cross-fertilization is not excluded.

Series III.—I pass by *E. grandiflora*, *E. micrantha*, and *E. pulchella* as having less connection with British species, to consider those species of the group *Parviflora* which have, in common, glandular hairs on the leaves and calyx, and which probably have a hybrid origin. The species are six in number, viz. *E. hirtella*, *E. drusocalyx*, *E. Jaeschkei*, *E. Regelii*, *E. brevipila*, and *E. tenuis*, but only one—*E. brevipila*—is British. *E. hirtella* is a peculiarly marked and distinct species. It has a very wide distribution, similar to and perhaps even wider than that of *E. Tatarica;* this fact, taken together with its absence in South Europe, except in small and isolated areas, in the Pyrenees, South-west Alps, the Balkan Peninsula, and the Siebenbürger, point to this as a typical representative of those species, the area of which, though widely extended in tertiary times, was reduced in Europe during the post-tertiary glacial epoch. We therefore look upon *E. hirtella* as an old and unaltered connection of *E. palæo-pectinata*.

E. brevipila, the only species which is British, comes morphologically near to the *E. palæo-pectinata* series, but it has glandular hairs. May it be a hybrid between *E. pectinata* and *E. hirtella*, or between *E. stricta* and *E. hirtella*, as these species are now found in company in the Southern Alps? But *E. hirtella* is not found in Northern Europe, and Prof. Wettstein thinks it improbable that, having such an origin, *E. brevipila* could have spread northwards, or that it was a hybrid between *E. hirtella* and any member of the *E. palæo-pectinata* series. The supposition that it had a more or less distinct origin in the south from that which it had in the north, and that two forms so similar were originated that they cannot now be distinguished one from the other, is also improbable. A more probable supposition is that *E. hirtella* was not one of its parents, but that it is a hybrid between *E. Rostkoviana* and *E. stricta*. There can be no doubt that it had its origin far back in time, as is betokened by its widely-extended area, also by the occurrence in the south of the closely-allied species *E. tenuis*, which has the same relation to *E. brevipila* as *E. montana* has to *E. Rostkoviana*, and *E. cærulea* to *E. curta*.

Scheme III. shows at a glance the phytogeny of the species contained in the group *Parvifloræ*.

SCHEME III.


Ancestors towards the end of tertiary epoch.
E grandiflora, s.l.
E. palæo-Tatarica.
?
E. hirtella, s.l
E. Rostkoviana, s.l.
E. versicolor Kern.
E. Schlagintweitii, s.l.
E. palæo-pectinata
E. palæo-nemorosa
E. stricta s.l.
E. curta s.l.
E. nem. s.l.
E. minima s.l.
E. latifolia s.l.
Recent Species.
E. grandiflora Hchst.
E. borealis Towns.
E. stricta Host.
E. pumila Kern.
E. pectinata Ten.
E. Tatarica Fisch.
E. Maximowiczii W.
E. multifolia W.
E. Americana W.
E. cærulea Tsch.
E. curta Fr.
E. nemorosa Pers.
E. Cebennensis Mart.
E. gracilis Fr.
E. occidentalis W.
E. minima Jacq.
E. Liburnica W.
E. Tatræ W.
E. Willkommii Frn.
E. Foulaensis Towns.
E. latifolia Pursh.
E. mollis Led.
E. Oakesii W.
E. micrantha Brenn.
E. drusocalyx Frn.
E. Regelii W.
E. brevipila B. & G.
E. tenuis Brenn.
E. pulchella Kern.
E. hirtella Jord.
E. Jaeschkei W.

SECTION I., EUEUPHRASIA; SUBSECTION I., SEMICALCARATÆ; GROUP II., GRANDIFLORÆ.

There are twelve species in this group. The species are, *E. Himalayica*, *E. Schlagintweitii*, *E. Roskoviana*, *E. campestris*, *E. montana*, *E. paucifolia*, *E. petiolaris*, *E. Kerneri*, *E. picta*, *E. versicolor*, *E. alpina*, *E. Christii*. Their distribution betokens a connection with the *E. pectinata* series, and so does the zenogamic character of the flowers. The areas they occupy are to be found in the southern portions of the area occupied by that series. Morphologically seven of the species are distinguished by being furnished with glandular hairs, and of these we have in the British Isles only one representative, viz. *E. Rostkoviana*.*

It is interesting to find that *E. paucifolia* has a similar relation to *E. Schlagintweitii* or *E. Himalayica* as *E. montana* has to *E. Rostkoviana*. *E. Rostkoviana* occupies a Mid-European area; the other three species are found only in the Himalaya. The morphological character of all these betokens near relationship; possibly they have sprung from an ancestor which formerly occupied a wide range over Eastern Asia and South-west Europe. *E. petiolaris* is a mountain species occupying an area between that of *E. Rostkoviana* and the Himalayan species, and may possibly have a similar origin. *E. campestris* doubtless sprung from *E. Rostkoviana*.

Of the eglandular species, which are five in number, we have also only one representative, viz. *E. Kerneri*. As far as our present knowledge goes, these five species only occur in South-west Europe.

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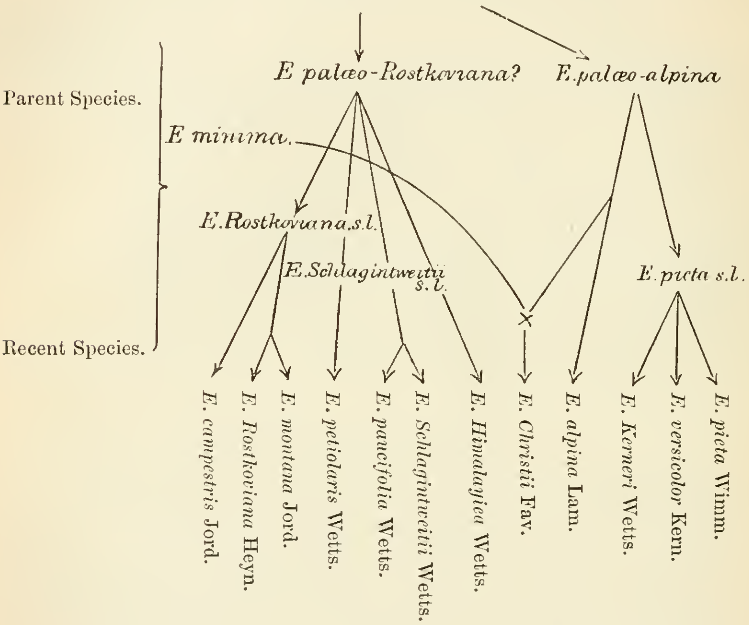
* Unless *E. campestris* Jord. can be reckoned as indigenous. See the remarks which follow the descriptions of *E. Rostkoviana* and *E. campestris*.

Prof. Wettstein thinks that, being so nearly related, they have their origin from an ancestor which once had a wider range, and that further research may extend the range of one or other of these existing species. Scheme IV. shows the phytogeny of the *Grandifloræ.*

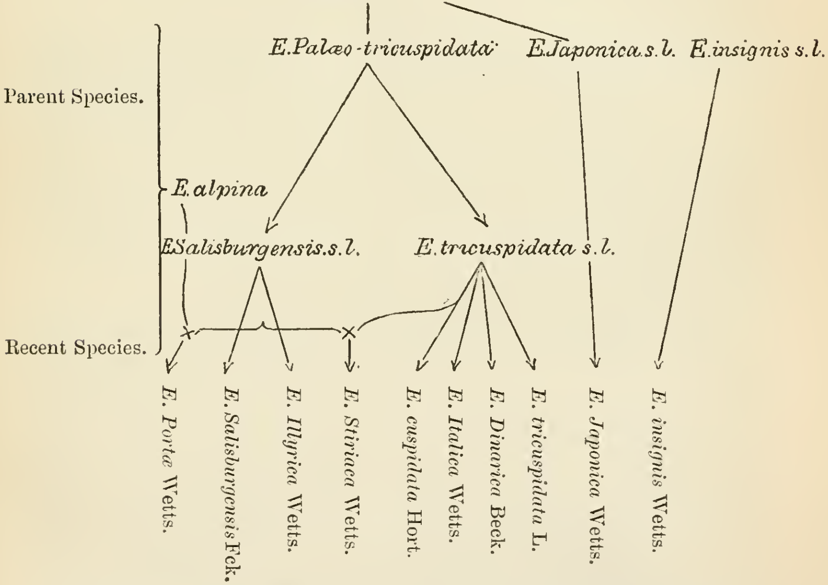
SCHEME IV.


Parent Species.
Recent Species.
E palæo-Rostkoviana?
E.palæo-alpina
E minima.
E.Rostkoviana.s.l.
E.Schlagintweitii s. l.
E.picta s.l.
E. campestris Jord.
E. Rostkoviana Heyn.
E. montana Jord.
E. petiolaris Wetts.
E. paucifolia Wetts.
E. Schlagintweitii Wetts.
E. Himalayica Wetts.
E. Christii Fav.
E. alpina Lam.
E. Kerneri Wetts.
E. versicolor Kern.
E. picta Wimm.

SECTION I., EUEUPHRASIA; SUBSECTION I., SEMICALCARATÆ; GROUP III., ANGUSTIFOLIÆ.

This group includes ten species, viz. *E. Portæ* Wetts., *E. Salisburgensis* Funck, *E. Illyrica* Wetts., *E. tricuspidata* L., *E. cuspidata* Hort., *E. Dinarica* Beck (Murb.)., *E. italica* Wetts., *E. Stiriaca* Wetts., *E. japonica* Wetts., *E. insignis* Wetts. With the exception of the two last-named species, which are natives of Japan, the species of this group have a remarkable distribution, east and west in South Europe and in isolated portions of North Europe. The Japanese and European species are doubtless closely allied, but no representatives of the group occur at the present in any intermediate area. As regards the European species, they represent two morphological series: the first includes *E. tricuspidata*, *E. cuspidata*, *E. Dinarica*, *E. Stiriaca*, *E. Italica;* the second includes *E. Salisburgensis*, *E. Portæ*, and *E. Illyrica*. Putting aside *E. Stiriaca* and *E. Portæ*, which are quite local and of hybrid origin, it is here again most remarkable, as has already been noticed with regard to species in the group *Parvifloræ*, that the areas of the more nearly related species do not intersect, whereas those of less closely allied species do intersect or occupy portions of the same area.* From this we may conclude that the species of each series had each a common ancestor, the first of which the Professor names *E. tricuspidata* s. l., the second *E. Salisburgensis* s. l., and he thinks that the ancestor of the first series was older than that of the second, and that the latter was descended from the former, and for the following reasons:—The distribution of *E. tricuspidata* s. l. is such as would betoken its existence in the tertiary epoch; it has a considerable east and west extension in South Europe, and is found in the mountains of the South Europe peninsulas; it is morphologically nearer to the Japanese species than is *E. Salisburgensis;* it exhibits in its descendants a greater variety of forms or species, thus betokening a greater lapse of time for their development; lastly, the flowers of *E. tricuspidata* s. l. are larger and are fitted for zenogamy, while the flowers of the second series are autogamic.

SCHEME V.


E. Palæo-tricuspidata
E. Japonica s. l.
E. insignis s. l.
Parent Species.
E. alpina
E. Salisburgensis s. l.
E. tricuspidata s. l.
Recent Species.
E. Portæ Wetts.
E. Salisburgensis Fck.
E. Illyrica Wetts.
E. Striaca Wetts.
E. cuspidata Hort.
E. Italica Wetts.
E. Dinarica Beck.
E. tricuspidata L.
E. Japonica Wetts.
E. insignis Wetts.

To repeat—*E. tricuspidata* s. l. at the end of the tertiary epoch had its extension in the mountains of Mid and South Europe; this type also extended to East Asia. The glacial epoch then broke up the connection and diminished its extension in the northern portion of its area, and at the same time brought about the development of *E. Salisburgensis* s. l. fitted to resist the severity of the climate. At the end of the last glacial epoch, under more favourable conditions *E. tricuspidata* spread from the plains of South Europe back into the valleys of the neighbouring mountains, also into the Apennines and the Spanish mountains, bringing into existence the several species fitted for the areas in which they are now found. *E. Salisburgensis*, fitted for a colder climate, spread in all directions, and has maintained an existence in isolated areas up to the present day in the mountains of South Europe, Mid-Europe, in Ireland, Norway and Sweden, in the Pyrenees, and the Carpathians. The only species immediately related to *E. Salisburgensis* is *E. Illyrica*, which occurs in the north-west of the Balkan Peninsula; its relation to *E. Salisburgensis* is very close.

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* See Prof. Wettstein in *Oesterr. Botan. Zeitschrift*, 1893.

Scheme V. (p. 335) exhibits the phytogeny of the *Angustifoliæ*.

(To be continued.)

NOTES ON NAUCLEEÆ.

By James Britten, F.L.S.

In a recent number of this Journal I felt it necessary to criticise somewhat severely a monograph of a genus of *Rubiaceæ* lately issued by the Linnean Society. No greater contrast to the slipshod and slovenly "revision" of *Pentas* could be found than is presented by Mr. Haviland's careful and scholarly monograph of *Naucleeæ*;[*] and it is almost incredible that both should have been issued by the same Society within a few months of each other. Every omission which characterized Mr. Scott Elliot's monograph of *Pentas* is supplied by Mr. Haviland in his revision of *Naucleeæ*, with the result that an important contribution has been made towards a monograph of a large and difficult order of plants.

While arranging the *Naucleeæ* in the National Herbarium in accordance with the monograph, I have made a few notes which I propose to put on record. This is the more desirable because Mr. Haviland, as it seems to me, has hardly done justice to the material placed at his disposal, although he duly examined the specimens therein contained. I must, however, preface my remarks by saying that, as a whole, the work has been excellently well done, and that my criticisms deal merely with points of detail. The Linnean Society may be congratulated on the prompt publication of this and the other papers issued in the same number of the Journal—a pleasing contrast with the delay which has lately characterized its proceedings. There is an absence of the extravagance in style of printing which has sometimes been manifest, and although there is still room for improvement in the editing, the papers in the present number seem to have been read with reasonable care.

In an introduction of twenty pages, Mr. Haviland deals with the nomenclature, characters, classification, and distribution of the group in a way which shows he has a complete grasp of his subject.

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[*] "A Revision of the Tribe *Naucleeæ*," by G. D. Haviland, M.A., M.B., F.L.S. *Journ. Linn. Soc.* xxxiii. pp. 1–94, tt. iv. July 1, 1897.

He has paid much attention to the early history, and the varied information brought together under the first of the above headings is full of interest.

One or two points, however, require correction or amplification. For instance, he says: "There is a specimen of *Mitragyna parvifolia* named [*Nauclea orientalis*] in the Banksian Herbarium, and referred to by Gaertner in 1788, *De Fructibus*, i. p. 151. Mr. Daydon Jackson is of opinion that the name is probably not Linnæus's. The only other specimen in the Herbarium labelled *Nauclea* is one of *Adina globiflora;* and Mr. Jackson thinks the writing in this case is undoubtedly that of Linnæus."

There is certainly some mistake here, and it is not easy to see how it arose. No one is better acquainted with the handwriting of Linnæus than Mr. Jackson; and it is almost impossible to suppose that he could have said that the name *Nauclea orientalis* in the sheet of *Adina* referred to was written by Linnæus. On both the sheets mentioned by Mr. Haviland the name is in Solander's hand, as may be seen by comparison with the description in Solander's MS. (which, by the way, refers to *Nauclea Forsteri*, thus affording a further illustration of the confused application of the name *orientalis*, to which Mr. Haviland refers).

It is, I think, unfortunate that Mr. Haviland did not consult some one at the Museum about the specimens there, as in some cases we could have given him useful information. For instance, a reference to Plukenet on one of the sheets just referred to would have suggested to one familiar with the Herbarium the desirability of consulting Plukenet's specimens in the Sloane Herbarium. Herein (vol. xcii, fol. 19; xciii, fol. 9) are to be found specimens of *Mitragyna parvifolia*, of which the following description,* much earlier than any cited by Mr. Haviland, is given in Plukenet's *Mantissa*, p. 4 (1700), and is reprinted in Ray's *Historia Plantarum*, iii. Dendrol. p. 129 (1706):—

"ACROCHORDODENDROS S. Arbor *Indica* prægrandis, foliis integris, Platani fructu verrucoso minore, sive Fragi formi duro, cujus singuli bati seu tuberculi sunt capsulæ seminales. Melius forsàn, Arbor *Indica* prægrandis, foliis integris fructu rotundo parvo Fragiformi è tuberculis capsularibus composito. Nellacarumbac *Malabarorum*." On the tickets attached to this specimen Plukenet has added "each wart is bicapsular," and the name "Rutrasha candamba."

Our specimens of *Mitragyna parvifolia* illustrate another point in which Mr. Haviland's monograph might have been made more complete—*i. e.* by the systematic inclusion of the Museum specimens. Koenig's Coromandel specimens, from which Gaertner's description was taken, should certainly have been mentioned, as well as those from Roxburgh and A. P. Hove, and, among more recent gatherings, those of Beddome; Wallich's numbers, too, are sometimes omitted. It is unnecessary to cite all the instances of omission; but a *Sarcocephalus cordatus* from Horsfield, Dietrich, Buchanan-Hamilton, and Koenig; *Adina globiflora* from Salisbury (type), Robertson, and

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* There is a figure in *Phytographia*, t. ccclxi, 5 (1705).

Macartney; *Nauclea Forsteri* from Banks, Wiles and Smith, and Lay and Collie; *Mitragyna africana* from Brass and G. Don; *Uncaria setiloba* from Christian Smith; *U. tomentosa* from Pavon; *U. guianensis* from Aublet—these and many similar records, all of which were seen by Mr. Haviland and for the most part named by him—should have found mention.

Mr. Haviland is again unfortunate in his reference to the Museum Herbarium when he treats of *Sarcocephalus*. He says: "A specimen from Africa of *Nauclea sambucina* Winterbottom (1803) was labelled *Sarcocephalus esculentus* by Afzelius perhaps as early as 1798." But as a matter of fact there is no specimen from Winterbottom in the Museum, nor, I believe, are any plants from him in existence; while the writing of the name, which he (following Sabine) attributes to Afzelius, is, for the genus, that of Dryander, to which Mr. J. J. Bennett added the specific portion; moreover, Mr. Hiern informs me that the specimen in Afzelius's own herbarium at Upsala bears a different specific name. Later on (p. 25), Mr. Haviland seems in doubt as to the whereabouts of the type of the species, yet this can hardly be matter for conjecture. Brown, when first publishing the name (with description) in Tucker's *Congo*,* p. 467, distinctly refers to Afzelius's specimen in Herb. Banks; and Sabine's description and plate in *Trans. Hort. Soc.* (v. 442, t. 18, 1824), from which our knowledge of *S. esculentus* dates, are based on George Don's specimens, which are in the British Museum. A reference to this genus which has escaped Mr. Haviland's notice will be found in Hornemann's paper *De indole plantarum Guineensium* (1819), p. 18, where it is the former of the "Genera 2 nova facie *Naucleæ* et *Psychotriæ*."

Mr. Haviland rightly places Loureiro's *Restiaria cordata* under *Uncaria pedicellata*, and says that "in referring [the plant] to this species I have relied upon a specimen so labelled which is in the British Museum." But he does not seem to have recognized that the specimen in question is from Loureiro himself, and bears the native name (cited in *Fl. Cochinch.*) in his handwriting.

It is not easy to see on what principle Mr. Haviland has selected the localities which he gives in illustration of the distribution of the species. We are inclined to think that they are for the most part limited to the plants that he has seen in the Kew Herbarium, though this is neither stated nor implied; and the usual mark of authentication is never employed, so that we do not actually know that the author has seen the specimens. Among the African species, Mr. Hiern often gives a fuller list than Mr. Haviland supplies, twenty years later; it is strange to find, under *Sarcocephalus esculentus*, that none of the early collectors—Afzelius, Don, Smeathman, Park—are mentioned, although the species was established on the plants of the two former. Nor do we understand the meaning of "n.?" which often follows the name of a collector, unless Mr. Haviland supposes that every one must have numbered his collections somewhere or other, which is certainly not the case. Yet as he omits many numbers which are easily ascertainable—*e. g.* those of Schweinfurth (two collections) and Welwitsch at the top of p. 73—it can hardly be that he considers them essential. But whatever it may mean, "n.?" is an undesirable addition to our list of symbols.

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* The Report by Afzelius to which both Brown and Sabine refer being but little known, it may be worth while to quote the brief description of *Sarcocephalus* which is given under the heading "32. Country Figs":—"These in no respect resemble the true Figs, except in the number of their gritty seeds. This fruit is of the size of an apple, nearly round, and agreeable to the taste; when sufficiently ripe resembling the European Strawberry. The tree is new and non-descript; it is found growing in the best soil in the woods." (*Substance of the Report delivered by the Court of Directors of the Sierra Leone Company*, 1794, Appendix "by Mr. Afzelius, their Botanist," p. 171).

I am sorry Mr. Haviland has not taken the opportunity of revising the nomenclature of the group in accordance with the law of priority. He is fully aware that certain changes would result from such a revision, but he has "assumed that rules of priority were made to help, and not to hinder," and on that assumption has refused to make the necessary alterations. He says, "if [the rules] were exactly followed, *Uncaria* would be *Ourouparia*, *Sarcocephalus* would be *Nauclea*, *Nauclea* would have to be renamed, and probably *Mitragyna* would be *Mamboga*"; and it is difficult to see how the substitution of these earlier names could be considered a hindrance. They will certainly come in sooner or later, if they have not already done so—*Ourouparia*, for example, as Mr. Haviland points out, has been adopted by Baillon, K. Schumann,* and others, and the conscious substitution by Schreber of *Uncaria* for this earlier name seems quite unjustifiable. Six of Mr. Haviland's thirty-four species are either new or are now first placed in the genus *Uncaria;* and no fitter opportunity could have been found for the return to the earlier name. The retention of *Nauclea* necessitates the statement "typus nullus" after the name; then, after a definition of the genus as now understood, comes a reference to "*Nauclea* Linn. Sp. Pl. ed. 2, 243," followed by the remark, "None of the plants called *Nauclea* by Linnæus are now in this genus, though there is no doubt he would have called those in it *Nauclea* if he had seen them." But as Mr. Haviland tells us elsewhere that "Linnæus founded his *Nauclea orientalis* on two species of *Sarcocephalus*," it is difficult to see how the retention of his name for the plants he described could be regarded as a "hindrance."

The monographer has taken much trouble to see the types of the species described, and in many cases indicates where these are to be found. The anxiety to consult types, which is worthy of all praise, may, however, be carried too far, and there are symptoms of this among some of our most careful workers. Mr. Arthur Bennett, for example, gives a well-known *Carex* a new name because he has seen no type of *C. elata* Allioni, which has been recognized as the earliest unoccupied name for the plant. Mr. Haviland adopts *Nauclea moluccana*, published by Miquel in 1868–9, in preference to *N. glabra* Roxb. (1832), which he cites as a synonym, and explains his action by saying: "Although Roxburgh's description agrees in every respect with this plant, I have retained Miquel's name because his type specimens exist, whilst there are probably no figures or specimens of Roxburgh's plant." I cannot think that in either case the action is justified.

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* In Engler & Prantl's *Nat. Pflanzenfamilien* (iv. 4, 57, 1891) Dr. Schumann adopts Aublet's spelling, *Ourouparia;* but in *Pflanzen-Welt Ost Afrikas*, th. C, 378 (1895), he alters this to *Uruparia*, apparently in order to accommodate the name to Latin form. Alterations of this kind are likely to cause confusion, and can hardly be justified. It is difficult, however, to see how restoration of *Ourouparia* conforms with the Berlin rule, to which Dr. Schumann has given his adhesion, by which it is not allowed to revive names which have been ignored for fifty years. Everything tends to show that the present method of local and often hasty legislation tends to increase rather than to diminish the existing confusion in matters of nomenclature.

There are signs here and there of haste, as on p. 64, where Mr. Haviland says he is "altogether uncertain" as to the twelve species of *Nauclea* in Blanco's *Fl. Filip.*, but identifies two of them in the list of "species a *Naucleâ* exclusæ" which immediately follows. *Mitragyna macrophylla* is given as of "Hav.," and *Stephegyne macrophylla* Hiern, in *Fl. Trop. Afr.* iii. 41, is cited as a synonym; but Mr. Hiern (*l. c.*) placed the plant in *Mitragyna*, and the species has never been called *Stephegyne*. A certain looseness of expression occasionally renders the author's meaning doubtful. But these criticisms as to matters of detail do not detract, and are not intended to detract, from the value of the revision, and I trust the Linnean Society will take care that the high level here reached is maintained in future monographs.

DECADES PLANTARUM NOVARUM AUSTRO-AFRICANARUM.

AUCTORE R. SCHLECHTER.

(Continued from p. 283.)

DECAS V.

41. **Heliophila sisymbrioides**, sp. n. Suffrutex erectus, basi lignescens, simplex vel parum ramosus, virgatus, gracillimus, 70–90 cm. alto; caule tereti stricto, tenuissime puberulo foliato; foliis erecto-patentibus, pinnatifidis subglabris, petiolo incluso, 4–5 cm. longis, segmentis patentibus, utrinque 4–6, linearibus oblongisve acutis vel obtusis, integris vel rarius obscure paucidentatis, petiolo semipollicari, supremis linearibus; racemo valde laxe elongato, floribus purpureis illis *H. stylosæ* Burch. similibus, calycis foliolis oblongis obtusissimis, membranaceo-marginatis, concavis, dorso minute puberulis vel subglabris, 0·5 cm. longis; petalis e basi lineari-unguiculata albida in laminam patentem roseam oblongam obtusam dilatatis, 0·8–1 cm. longis, lamina medio fere 0·4 cm. lata; staminibus erectis, filamentis subulatis edentatis; stylo subulato minute puberulo, stigmate capitato; siliquis erectis, anguste linearibus subintegris glabris, stylo vix incrassato subulato coronatis, 5·5–7 cm. longis, 0·2–0·3 cm. latis, seminibus oblongis, apice anguste marginatis.

In regione austro-orientali: In clivis montis Andriesberg prope Bailey (in ditione Queenstown), alt. c. 6500 ped., Jan. 1897; *E. E. Galpin*, No. 2260.

A very distinct plant, in general aspect resembling some species of *Sisymbrium;* it belongs to the section *Orthoselis.* I propose to place it next to *H. callosa* Burch., although the character of the lobed leaves should bring it nearer to *H. abrotanifolia* Herb. Banks; with the former it seems, however, to have more in common than with any other species.

42. **Aspalathus Leipoldtii,** sp. n. Fruticulus adscendens valde ramosus; ramulis flexuosis teretibus foliis fasciculatis laxe vestitis; fasciculis foliorum basi pulvinato-tomentosis; foliis simplicibus subulatis acutis vel mucronulatis, carnosiusculis, glabris, 0·3–0·7 cm. longis, vix 0·1 cm. diametientibus; floribus aureis terminalibus ad apices ramulorum valde abbreviatorum, breviter pedicellatis, pseudo-spicatis; pedicellis teretibus tenuiter appressim strigosis supra medium bracteolis 2 minutis ornatis; calyce subcampanulato, 0·3 cm. longo, segmentis valde abbreviatis deltoideis, tenuissime puberulo; vexillo breviter unguiculato, lamina suborbiculari obtusa, extus puberula, intus glabra, c. 0·7 cm. longo, alis e basi unguiculata subito in laminam oblique oblongam obtusam glabram, 0·4 cm. longam dilatatis, 0·6 cm. longis; carina cymbiformi obtusa puberula, basi unguiculis tenuibus donata, alis æquilonga; ovario sericeo, 2-ovulato; stylo filiformi genuflexo, dimidio superiore glaberrimo.

In regione austro-occidentali: In collibus prope Clanwilliam, solo arenoso, alt. c. 450 ped., 21 Sept. 1896; *L. C. Leipoldt*, No. 256.

I am not quite sure about the leaves of this plant being constantly unifoliolate, but in the good set of specimens in my herbarium I have not been able to find any trifoliolate ones. In habit the plant resembles most *A. abietina* Thbg., but the calyx-segments, the hairy vexillum, and the obtuse carina with the alæ of equal length, distinguish our plant well. *A. corymbosa* E. Mey. and *A. tenuifolia* DC. with solitary leaves are widely different from our plant.

43. **Kalanchoe Pentheri,** sp. n. Suffrutex erectus, 50–60 cm. alto; caule stricto teretiusculo villoso, basi demum glabrescente; foliis oppositis patentibus patulisve, submembranaceis, obovato-oblongis, obtusis, puberulis vel (demum?) glabrescentibus, integris vel obscure crenatis, sessilibus, reticulato-nervosis, usque ad 10 cm. longis, usque ad 3 cm. latis, superioribus angustioribus; inflorescentia laxe cymosa dense villosa, c. 20 cm. longa, ramis dichotome ramulosis, 5–6 cm. longis, subdense plurifloris; floribus breviter pedicellatis; calycis segmentis ovato-lanceolatis acuminatis villosis, 0·6 cm. longis; corollæ tubo 1–1·2 cm. longo, e basi ampliata, glabra, 0·4 cm. diametiente, angustato piloso, fauce 0·1 cm. diametro, segmentis lanceolatis aristato-acuminatis patentibus, c. 0·4 cm. longis, purpureis; filamentis filiformibus glabris, corollæ tubo alte adnatis, antheris oblongis obtusis, parti liberæ filamentorum paulo brevioribus; stylis subulatis; capsula calycem paulo excedente, glaberrima; seminibus oblongis, brunneis.

In regione austro-orientali: In fruticetis prope "Buiskop" in republica Transvaalensi, alt. c. 4500 ped., exeunte Maio 1895; *Dr. A. Penther.*

I am indebted to my friend Dr. A. Penther, of Vienna, for a collection of plants which he made during his expedition to the Zambesi, amongst which, besides several other novelties, I found this fine *Kalanchoe*, which differs from all our other South African species by its pilose corolla. It is nearest to *K. hirta* Harv., in which, however, the leaves are said to be conspicuously petioled. *K. rotundifolia* Harv. and *K. oblongifolia* Harv. differ by the want of the indumentum.

44. **Vangueria pygmæa**, sp. n. Fruticulus humilis, 10–15 cm. altus, e basi parum ramosus; ramis erectis adscendentibusve apice densius foliatis, pilis deflexis puberulis demum glabratis; foliis oppositis lineari-oblongis vel ellipticis, obtusiusculis, basin versus angustatis, brevissime petiolatis, utrinque subvelutinis, 4–7 cm. longis, medio fere 1–2 cm. latis; stipulis e basi dilatata subulatis, intus persæpe fasciculo pilorum ornatis; cymis axillaribus abbreviatis, foliis duplo vel plus duplo brevioribus; bracteolis minutis; pedicellis erecto-patentibus, subvelutinis florum fere longitudine; calyce corollæ duplo fere breviore subvelutino, segmentis lineari-lanceolatis, erecto-patentibus; corollæ tubo subcampanulato extus glabro, calycis segmenta subexcedente, lobis ovatis acutis extus puberulis, intus glabris, erecto-patentibus, c. 0·4 cm. longis, corollæ fauce intus fascilis pilorum deflexorum ornatis; staminibus corollæ lobis alternantibus fauci insertis, filamentis subulatis brevibus, antheris oblongo-lanceolatis apiculatis, loborum medium subexcedentibus; stylo subfiliformi glabro, stigmate capitato, antherarum apicem subexcedente; fructu subgloboso glabro, calycis lobis persistentibus coronato, 1–1·5 cm. diametiente.

In regione austro-orientali: In graminosis, Elandsfontein, prope Johannesburg in republica Transvaalensi, alt. c. 5500 ped., Nov. 1896; *D. F. Gilfillan* (*E. E. Galpin*, No. 1416 in Herb. Schlechter).

Allied to *V. Zeyheri* Sond., but well distinguished by its calyx, the hairy leaves. and lobes of the corolla; the flowers are green.

45. **Anthospermum Galpinii**, sp. n. Fruticulus erectus ramosus, 2–3-pedalis, habitu *A. æthiopico* Thbg. similis; ramis erectis angulatis primum microscopice puberulis, demum glabratis, mox lignescentibus, subdense, præsertim apicem versus, foliatis; foliis ternatim verticellatis, erecto-patentibus, linearibus mucronulatis, utrinque glabris, marginibus plus minusve revolutis, 0·6–1 cm. longis; fructibus axillaribus sessilibus oblongis, apice subemarginatis, calycis dentibus subobsoletis; mericarpiis semiteretibus oblongis obtusis, dorso puberulis, 2·5 mm. longis; stigmatibus filiformibus flexuosis, villosis, elongatis, corollam 4-partitam multo excedentibus, c. 0·6 cm. longis.

In regione austro-orientali: In collibus ad portum "St. Johns" dictis "West Gate," in terra "Pondoland" appellata, alt. c. 1100 ped., Dec. 1896; *E. E. Galpin*, No. 3472.

This species so much resembles some forms of *A. æthiopicum* Thbg. that it might easily be taken for that, if the fruits were not very different. The latter resemble very much those of *A. Lichten-*

steinii Cruse. *A. hispidulum* E. Mey., which is unknown to me, must be allied to our species, but differs by the hairy leaves and the subulate calyx-teeth on the mericarp. Male flowers of our plant I have not seen.

46. **Berkheya hypoleuca**, sp. n. Robusta erecta ramosa, caule tomentosulo foliato; foliis radicalibus rosulatis obovatis obtusis, sinuato-dentatis, sparsim spinoso-ciliatis, basin versus angustatis subpetiolatis, subtus dense niveo-tomentoso, superne tenuissime tomentosulis demum glabratis, scabridiusculis, 10–14 cm. longis, supra medium 3–6 cm. latis; caulinis oblongis lanceolatisve basi cordatis inferioribus decurrentibus; capitulis florum in axillis foliorum superiorum terminalibusve breviter pedunculatis aureis, c. 3 cm. diametientibus; involucri foliolis ovato-lanceolatis aristato-mucronatis spinulis paucis ciliatis, nunc radiis æquilongis nunc paulo brevioribus, marginibus apicem versus persæpe revolutis; floribus radii 12–15 patentibus ligulatis apice breviter 3-lobulatis, extus basin versus sparsim puberulis, 1·5–1·7 cm. longis, medio fere 0·2–0·3 cm. latis; floribus disci tubulosis, 1·1 cm. longis, basin versus puberulis, alte 5-fidis, lobis erectis linearibus obtusiusculis, filamentis filiformibus glabris, antheris linearibus acutis, filamentis multo longioribus, corollæ lobis brevioribus; stylo filiformi brachiis corollam paulo superantibus; acheniis turbinato-cylindricis 5-costatis, sericeis, pappi squamulis c. 20, 2-seriatis, subspathulato-oblongis obtusis, apice nunc minute dentatis nunc subintegris.

In regione austro-occidentali: In cacumine montis Andriesberg prope Bailey, in ditione Queenstown, alt. c. 6400 ped., Dec. 1896; *E. E. Galpin*, No. 2235.

Belonging to section *Eu-Stæbæa*, and nearest to *B. buphthalmoides* Schltr. (*Stæbæa buphthalmoides* DC.), but distinguished by the leaves, longer rays, and glabrous (not downy) pappus. The rays are yellow.

47. **Wahlenbergia Galpiniæ**, sp. n. Herba gracilis, erecta, subsimplex vel parum ramosa, 30–60 cm. alta, caule nunc bene foliato, nunc foliis paucis donato, stricto vel plus minus flexuoso; foliis anguste linearibus patentibus patulisve acutis, rarius oblanceolato-ellipticis acutis, integris vel obscure denticulatis, 1·2–4·5 cm. longis; floribus pallide cæruleis nunc racemosis nunc paniculatis, breviter pedicellatis; ovario pro genere minus elongato subclavato glaberrimo, calycis dentibus subtriangulis acutis glabris, corollæ 4–6-plo brevioribus; corolla alte 5-fida, 0·8–1·3 cm. longa, segmentis lineari-lanceolatis vel lineari-ellipticis acutis, glabris, 2–3 cm. latis; stylo subvilloso subulato, stigmatibus 2, erectis linearibus; filamentis e basi cuneata trilobulata hispidula, angustissime lineari-filiformibus glabris, 0·3 cm. longis, antheris linearibus obtusis, 0·4 cm. longis, stigmata paulo excedentibus; capsula subclavato-cylindrica glaberrima bivalvi.

In regione austro-orientali: In clivis montis Katberg, Mart. 1896; *Domina Amy Galpin* (No. 2059 in Herb. E. E. Galpin et Herb. Schlechter). In monte Andriesberg prope Bailey, alt. c. 6500 ped., Jan. 1897; *E. E. Galpin*, No. 2265.

The first specimens which I saw from the Katberg have well-developed leaves, whereas in those from the Andriesberg the leaves are but few and small. By its narrow bivalved capsule, which somewhat recalls *Prismatocarpus*, our plant is well distinguished from the other South African Wahlenbergias.

48. **Harveya pumila**, sp. n. Herba perennis pusilla, 6–9 cm. alta, exsiccatione nigricans; caule validiusculo, abbreviato, squamis oppositis, rotundatis obtusis vestito, glabro; inflorescentia corymboso-abbreviata, 2–8-flora; floribus subsessilibus pallide roseis, c. 4 cm. longis; bracteis calyce basi adnatis erectis linearibus subvillosis; calyce 2·5 cm. longo, tubo subcampanulato glabrescente vel nervis puberulo, segmentis linearibus lanceolatisve subacutis erectis, subvillosis; corolla oblique campanulata, tubo dimidio inferiore contracto glaberrimo, c. 0·4 cm. diametro, dimidio superiore ampliato apicem versus puberulo ad basin lobulorum villoso, fauce c. 1·2 cm. diametiente, lobis erecto-patentibus pro magnitudine corollæ parvulis subquadrato-spatulatis, subtruncatis apice minute subcrenulatis, marginibus ciliatis, dorso glabrescentibus intus glabris, 0·7 cm. longis, infra apicem vix 0·7 cm. latis; staminibus apicem tubi haud attingentibus, filamentis basi barbellatis dorso puberulis, anthere subfalcatis, apice reflexa acute apiculatis, basi calcaratis acutissimis, calcare incluso 0·3 cm. longis; stylo filiformi glaberrimo apice incurvo, stamina paulo excedente; stigmatis lobis subreniformibus.

In regione austro-orientali: In saxosis in cacumine montis "Andriesberg" prope Queenstown, alt. c. 6300 ped., Oct. 1896; *E. E. Galpin*, No. 2171.

This appears to be allied to *H. laxiflora* Hiern,* from which its stouter growth, the calyx, and the lobes of the corolla distinguish it very well.

[* This is an unpublished name: by Mr. Hiern's kindness we are enabled to supply a description of the plant taken from his MS. of the South African *Scrophularineæ* and other orders, prepared in 1874–5 at the request of Dr. Dyer for publication in the fourth volume of the *Flora Capensis*, then supposed to be imminent. It may be well to point out that the plant distributed in Macowan and Bolus's Herb. Norm. Austro-Africanum No. 378 as "*Harveya laxiflora* Hiern MS. in Herb. Kew," is not the true plant, but is referred by Mr. Hiern to *H. purpurea* Harv.; and that the former name does not exist in the Kew Herbarium. We have here an instance of the mischief likely to occur from the practice, prevalent in some quarters, of using MS. names, especially when this is done without access to original sources. Mr. Schlechter's species seems to be allied rather to *H. purpurea* than to *H. laxiflora*; he appears to have been misled as to its alliance by the name in Herb. Norm. Austro-Afric., No. 378.

"**Harveya laxiflora** Hiern MS. (anno 1875) in Fl. Cap. iv. *ined.* *H.* pubescens 7–18 cm. alta, caule simplice erecto vel adscendente brevi, foliis squamiformibus ovatis lanceolatisve parvis, racemo terminali laxe 1-5-floro maximam plantæ partem conficiente, bracteis linearibus lanceolatisve, pedicellis bracteatis 1–3 cm. longis quam in cæteris generis gracilioribus patentioribus laxioribusque, floribus 5–6 cm. longis, calyce pubescente 2–2·5 cm. longo, lobis lineari-lanceolatis inter se inæquilongis interdum dimidiato, corollâ fere glabrâ lilacinâ luteâve tubo apicem versus sensim dilatato plus minusve curvo limbo patente 4–5 cm. diam. lobis rotundatis marginibus crenulato-undulatis, stylo corollæ tubum æquante apicem versus curvo glabro, stigmate capitato subgloboso.

"Habitat in austro-occidentali: Tulbagh (*Dr. Pappe*!) et ad Genadenthal (*Kolbing*!)."

Ed. Journ. Bot.]

49. **Selago capitellata**, sp. n. Fruticulus erectus, ramosus, c. 30 cm. altus; ramis erectis gracilibus, teretibus, subsquamuloso-puberulis foliatis; foliis fasciculatis vel superioribus nunc sparsis, erecto-patentibus, linearibus acutis glabris, internodia plerumque excedentibus, 6–11 cm. longis, c. 0·1 cm. latis, 1-nerviis; capitulis florum terminalibus ad apices ramulorum magnitudine fere pisi in racemum elongatum dispositis; bracteis oblongis obtusis ciliatis, calycem paulo excedentibus: calyce 5-fido, hispidulo, segmentis superioribus 2 inferioribus paulo majoribus usque ad medium inter se connatis, vix 0·1 cm. longis, inferioribus 3 lineari-lanceolatis acutis alte liberis; corolla glaberrima, tubo calyci fere æquilongo e basi subcylindrica fauce dilatato, lobis patentibus, superioribus 2 in laminam subquadratam 2-lobatam, 1·5 mm. longam connatis, inferioribus 3 divaricatis oblongis obtusissimis, 0·2 cm. subæquilongis; staminibus brevioribus paulo longioribus bene exsertis, filamentis filiformibus glabris apice inflexis, antheris minutis subquadratis; ovario ovoideo glaberrimo; stylo filiformi flexuoso, antheras superante.

In regione austro-orientali: In saxosis prope "Johannesburg," parte "Jeppes Town" appellata, alt. c. 6000 ped., Febr. 1894; *Domina Marie Galpin* (No. 1398 in Herb. E. E. Galpin et Herb. Schlechter).

I propose to place this species near *S. hyssopifolia* E. Mey., although in habit it looks very different. Unfortunately there is no mention made about the colour of the flowers, which, as usual in the genus, has faded even in the very fine specimens at hand.

50. **Thesium longirostre**, sp. n. Fruticulus decumbens, e basi ramosus; ramis elongatis glabris, exsiccatione sulcatis, pro genere bene foliatis; foliis anguste linearibus acutis, dorso carinatis glabris, nunc erectis nunc apice more *Th. lobelioidis* A. DC., recurvatis, subhamatisve, 0·6–1 cm. longis; floribus in axillis foliorum superiorum terminalibusve, 0·5 cm. longis; bracteolis foliaceis anguste linearibus acutis, dorso carinatis, erectis glabris, perigonii dimidium æquantibus; perigonio dimidio fere fisso, tubo campanulato, segmentis lineari-lanceolatis acutis, suberectis, extus glabris, intus apice margineque dense pilis niveis, barbatis, medio fasciculo pilorum brevium ad antheras tendentium donatis; staminibus ad basin segmentis insertis, filamentis subulatis, antheris oblongis 0·1 cm. longis, paulo brevioribus; stylo erecto subfiliformi antherarum apicem attingente, 0·2 cm. longo, stigmate styli apici vix crassiore; fructu ovoideo, 10-costato reticulato, apice rostro conspicuo (perigonio persistente effecto) coronato, rostro incluso, 0·7–0·8 cm. longo.

In regione austro-occidentali: In collibus saxosis prope Queenstown, alt. c. 3600 ped., Oct. 1896; *E. E. Galpin*, No. 2157.

Should be placed next to *T. lobelioides* A. DC. in section *Friesea*. The remarkable features of our plant are the long style and the long anthers, combined with the long perianth, which later forms the conspicuous beak on the nut. There is no sign of a limitation of the disk.

NOTES ON CO. DUBLIN PLANTS.

By H. C. Hart, F.L.S.

Glaucium flavum Crantz. This species has become very rare or extinct at Sutton, owing to shifting of beach by high tides and storms. Very abundant at Portrane, near Malahide.

Lavatera arborea L. Abundant on the Stack Rock at Ireland's Eye up to the summit, to which I climbed in June, 1887. The plant is tolerably surely native here and in a couple of other places in the Howth district.

Trigonella purpurascens Lam. In addition to the locality rediscovered by Mr. Colgan (where it is abundant), this forms the sod of an old grassy road leading from the Lighthouse road to the cliff path. Many square yards are covered here by this rare and minute species.

Caucalis arvensis Huds. Deer Park Quarry, and by the Boggeen brook, near Woodside, Howth.

**Sambucus Ebulus*. Railway-bank near Sutton Station, on the Howth side. An addition to the Howth Flora.

Echium vulgare L. Portmarnock, abundantly; and Portrane.

Hyoscyamus niger L. Plentiful south of the Howth Lighthouse, and at the Deer Park Quarry. Still abundant on Ireland's Eye.

Orobanche minor Sutt. (not *O. Hederæ*). On July 18th I gathered this at the Portmarnock sandhill district. It was parasitic on the native and abundant plants *Lotus corniculatus* and *Ononis arvensis*. The situation was an unbroken area of native vegetation. I have gathered this species previously in Wexford and Carlow on introduced clover (*T. repens*) amongst laid-down grass, where it was doubtfully established. The present locality gives the species the right to be held a native in Ireland. The specimens have thickened, almost tuberous stem-terminations just beneath the surface of the soil. From these the rootlets proceed, and to these rootlets the finer ones of the *Lotus* were attached. Those in connection with *Ononis* were of a thicker texture. There were a good many specimens of the *Orobanche*.

‡*Ballota nigra* L. Deer Park Quarry.

Atriplex rosea L. (*A. arenaria* Woods). At the Cosh, Howth, and on Ireland's Eye, and between Greenfields and Kilbarrack; Portmarnock strand opposite Baldoyle, and from that round the point to St. Marnocks, and again close to Malahide, abundantly; at Portrane Point opposite Malahide. I have not botanized along any of these shores for about ten or twelve years, but for many years previously they were constantly examined, and I feel sure this *Atriplex* did not occur there then, but had for its only locality that between Layton and Balbriggan, where I was familiar with the plant. If this be so (and I see no reason to doubt it), this sudden great increase of extension of range is a remarkable phenomenon. It may be a reappearance, as it was once recorded, but not since verified, at "Sutton and Baldoyle." An addition to the Flora of Howth.

A. portulacoides L. Muddy saltmarsh near Old Mill, at Portmarnock.

Euphorbia portlandica L. Abundant at Portrane, near Malahide, with *E. Paralias.*

Epipactis palustris Crantz. In considerable quantity at Portmarnock, one patch extending fully twenty yards, and containing hundreds of plants. In 1872 I found three plants there.

E. latifolia All. Sparingly in the demesne by the left-hand side of the path most to the westward leading from The Rhododendrons to the Castle. An important addition to the Flora of Howth.

Habenaria viridis Br. In a field south-west of the coastguard signal-station, near the tavern (Waldron's) where the "long car" stops.

†*Bromus erectus* Huds. Very abundant along the railway-banks near Howth Station. This is one of its favourite description of stations.

Zostera nana Roth. is abundant on the mud below the clubhouse of the Portmarnock Golf Links. It was originally recorded from the Baldoyle side of the estuary by A. G. More.

Holcus mollis L. This grass seems very scarce on Howth, and I have not met with it in 1897.

[*Lastræa æmula* Brackenbr. This was, I fear, an error, and does not occur in the Demesne Wood. Some form of *L. dilatata* was mistaken for it, perhaps.]

Ceterach officinarum Willd. Apparently on the increase about the Baldoyle and Sutton districts. Several new localities might be specified for this rare Howth fern.

Botrychium Lunaria Sw. Has been found near Glenaveena, on the south side of Howth, by Mrs. Culverwell.

Ophioglossum vulgatum L. Found with the last. This fern has also been recently found by the path leading from Demesne to Much Rock.

I apologize if I have failed to give credit for any of the above notes to other observers. I am away from reference-books, and to me they are mostly new.

NOTES ON WEST ROSS PLANTS.

By E. S. and C. E. Salmon.

The following notes refer to plants found in the neighbourhood of Kinlochewe, W. Ross (v.-c. 105), in Aug. 1896; and are supplemental to Mr. G. C. Druce's "Contributions towards a Flora of West Ross," in *Trans. Bot. Soc. Edinburgh*, 1894, vol. xx. part 1, pp. 112–171. As will be seen below, we are indebted to several botanists for the determination of critical plants, and we are also under special obligations to Mr. Arthur Bennett for kind help in many ways. New records for the vice-county are marked with an asterisk.

Thalictrum alpinum L. Beinn-a'-Mhuinidh (flowering).

Subularia aquatica L. Loch Maree; loch on Feith-an-Leothaid; Gleann-na-Muice. Two stations given in Mr. Druce's paper (*loc. cit.*).

**Rubus Rogersii* Linton. Kinlochewe. — **R. villicaulis* Koehl. Kinlochewe. — *R. pyramidalis* Kaltenb. Kinlochewe; two stations given by Mr. Druce. The above Rubi were named by Rev. W. Moyle Rogers, who remarked on the first two species, "the first W. Ross specimens that I have seen."

Saxifraga oppositifolia L. Beinn-a'-Mhuinidh. Noted as "rare" by Mr. Druce; two stations given. — *S. hypnoides* L. Beinn-a'-Mhuinidh and Glen Docherty. Also noted as "rather rare," with two stations.

Parnassia palustris L. Kinlochewe; two stations given.

Drosera anglica Huds. × *rotundifolia* L. (*D. obovata* Mert. & Koch). Loch Maireannach; Loch Clair.

Callitriche hamulata Kuetz. Loch Maree; stream running from Lochan-an-Iasgaich; near the river, Kinlochewe.

Epilobium alsinefolium Vill. Slioch. Named by Rev. E. S. Marshall. Included in Mr. Druce's list, with the note, "given in Dixon's list" ["Gairloch," *J. H. Dixon*, 1886], "and I have an impression that I saw it on Ben Eay, but it should be verified."— **E. anagallidifolium* Lam. × *palustre* L. Slioch. Named by Rev. E. S. Marshall.

Circæa alpina L. By a waterfall, Carn-a'-Ghlinne, Kinlochewe. —**C. alpina* L. var. *intermedia* (Ehrh.). Loch Maree. Mr. Arthur Bennett, who named the plant, reported:—"Your plant seems to me to be the *C. intermedia* Ehrh. *Exsicc.* (but according to Meyer, not of his herbarium). Your specimens seem in leaves, petioles, venation, &c., to agree with *alpina*, while in size, &c., with *lutetiana*. Prahl (*Krit. Fl. Holstein*) gives a very appropriate name for it, *i. e.* *C. alpina* var. *major* Hornemann. Most continental Floras seem to regard it as a cross between the two species, but Koch makes a full species of it, as also does Nyman in his *Consp. Fl. Europææ*." It is interesting, with regard to the question of the hybrid origin, or not, of *C. intermedia*, to note that *lutetiana* is not known from W. Ross; Westerness being the nearest county, Mr. Bennett tells us, from which it has been recorded.

Gnaphalium sylvaticum L. Noted as rare by Mr. Druce, and two stations only given; we found it in many places about Kinlochewe. also at Torridon. — *G. supinum* L. Slioch.

Hieracium graniticolum* W. R. Linton. Slioch. This species is recorded from S. Aberdeen (*Journ. Bot.* 1893, 145), where it was first discovered; we cannot find that it has been reported from elsewhere. — **H. atratum* Fr. f. Slioch. — **H. senescens* Backh. Slioch.—*H. anglicum* Fr. var. *longibracteatum* F. J. Hanb. Slioch. —H. Leyi* F. J. Hanb. Slioch; Carn-a-Ghlinne, Kinlochewe.— **H. Schmidtii* Tausch. Stream near Kinlochewe.— *H. rubicundum* F. J. Hanb. Ben Eay. One locality given in Mr. Druce's list.— **H. rubicundum* F. J. Hanb. var. *Boswelli* (Linton). Stream near Kinlochewe; Ben Eay.—**H. argenteum* Fr. Ben Eay.—**H. Somer-*

feltii Lindeb. Slioch. The above *Hieracia* were named by the Rev. E. F. Linton.

Pyrola minor L. Glen Docherty and A-Ghairbhe. Mr. Druce says this species is recorded in *Top. Bot.* "doubtless on the authority of Lightfoot, who records it from Little Loch Broom. Dixon includes it in his list."—*P. secunda* L. Carn-a'-Ghlinne.

Gentiana campestris L. River bank, Kinlochewe. Mr. W. H. Beeby reported on specimens sent, "apparently somewhat abnormal forms of *G. campestris*." Mr. Druce gives a single station.

Euphrasia brevipila Burm. & Gremli. Kinlochewe. Named by Mr. F. Townsend. Not recorded in Mr. Druce's list, but it seems probable that it may be the plant he records as "*E. officinalis* L., var. *Rostkoviana* Hayne, f. *borealis* Townsend" from several places, as Mr. Townsend (*Journ. Bot.* 1896, 444) says, "it remains to be determined whether *E. borealis* is a distinct form, or whether it should be referred to *E. brevipila*." — **E. Scotica* Wetts. (= *paludosa* Towns.). Ben Eay. Named by Mr. Townsend, who wrote (Dec. 1896), "it has only hitherto been found in Aberdeenshire." Mr. Druce (*Journ. Bot.* 1896, 390) states that it occurs in Argyll and Westerness.—*E. gracilis* Fr. Stream near Kinlochewe. Named by Mr. Townsend.

Utricularia neglecta Lehm. Loch on Feith-an-Leothaid; Loch Gleann-na-Muice. One station in Mr. Druce's list.—*U. intermedia* Hayne. Loch Maireannach; Loch Clair. One station given by Mr. Druce.

Malaxis paludosa Sw. Near Loch Clair; near river at Kinlochewe.

Allium ursinum L. Near A-Ghairbhe.

Carex pilulifera L. var. *longibracteata* Lange. Slioch. Named by Mr. Arthur Bennett. — *C. lævigata* Sm. Near A-Ghairbhe. Mr. Druce says, "on the authority of Mr. Grieve, I have not seen it in the county." Mr. Bennett verified the name.

**Poa Balfourii* Parn. Slioch. Named by Mr. Arthur Bennett.

Hymenophyllum unilaterale Bory. A-Ghairbhe; below Beinn-a'-Mhuinidh; abundant on rocks at Talladale.

Cryptogramme crispa Br. Slioch.

Equisetum palustre L. Sandy margin of Loch Maree, near Kinlochewe. Mr. Arthur Bennett reports, "a form between var. *tenellum* (Fr.) and the ordinary plant, I believe."

Lycopodium inundatum L. Near Loch Maireannach, near Kinlochewe. Recorded for W. Ross in *Top. Bot.* without personal authority. Mr. Druce says, "I have a recollection of seeing it recorded from Kinlochewe."

Isoëtes lacustris L. Slioch. — *I. echinospora* Dur. Lochs on Feith-an-Leothaid; Loch Gleann-na-Muice. In Mr. Druce's list as "recorded by Mr. Ewing."

Chara fragilis Desv. Lochs on Feith-an-Leothaid; Loch Gleann-na-Muice; also as a "form approaching var. *barbata*" in a stream at Kinlochewe. Named by Messrs. H. & J. Groves.

NEW NATAL PLANTS.

By J. Medley Wood, A.L.S.

DECADE I.

Hibiscus saxatilis Wood & Evans, n. sp. Suffruticosus, erectus, 1–2 ped. altus, parce ramosus, caulibus, petiolis, pedunculis, involucro et calyce dense stellato-hirsutis. Folia variantia ex ovatis ad profunde 3–5 lobata, lobis acute serratis, ciliatis, utrinque stellato-hispida, maturioria glabrescentia, basi 5–9-venis, 1–3 poll. longa, $1\frac{1}{4}$–$2\frac{1}{2}$ poll. lata. Pedunculi axillares terminalesque longiores petiolis. Involucellum bracteis 8–10 oblongo-ovatis, ciliatis, venosis, $\frac{3}{4}$–1 poll. longis, 2–3 lin. latis. Corolla involucello duplo longior. Ovarium dense hirsutum. Semina sericea. Flores albi, medio obscuri.

Habitat.—Natal. On a rocky hill, summit of Van Reenen's Pass, Drakensberg Mts., alt. 5–6000 ped., December; *J. Medley Wood*, No. 5961.

Rhus rupicola Wood & Evans, n. sp. Frutex erectus, multo ramosus. Rami ramulique hirsuto-pilosi. Folia trifoliolata petiolata, petiolo communi 2–5 lin. longo, foliolis obovatis, sessilibus, basin coarctantibus, mucronatis, subcoriaceis, reticulatis, integris, margine revoluto, pallidioribus infra lucidisque, nervo tantum pubescente, terminalibus 3–6 lin. longis, 2–3 lin. latis, lateralibus similibus, sed plerumque minoribus. Paniculæ axillares terminalesque multo longiores, foliis 1–2 poll. longæ, rhachi pedunculisque minute pubescentibus. Pedicellus flore paulo longior. Flores minuti, lutei. Drupa globosa, 1–2 lin. diam., glabra.

Habitat.—Natal. Amongst rocks below waterfall, Liddesdale, near Howick; *J. Medley Wood*, No. 3932, February, 1888.

Amongst South African species this comes nearest to *R. mucronata*, but differs from it by indument of branches, shape and size of leaves and petioles, length of panicles, colour of flower, and apparently also in size of drupe: we have no specimens of *R. mucronata* with which to compare it.

Rhynchosia ovata Wood & Evans, n. sp. Caulis suffruticosus, suberectus, cum ramis dense rufo-pilosus. Folia longe petiolata, trifoliolata, foliolis ovatis, mucronulatis, integris, basi rotundatis, trinervis, tenuiter hispidis et pilis longis albis ciliatis, lateralibus brevissime petiolulatis, terminalibus longioribus, maturis, $1\frac{1}{4}$ poll. longis, 1 poll. latis. Stipulæ subulatæ, striatæ, 3 lin. longæ. Racemi axillares terminalesque, folia superantes, floribus paucis, distantibus. Bracteæ haud visæ. Legumen oblongum, acutum, basi angustatum, 9 lin. longum, 3–4 lin. latum.

Habitat.—Zululand. Near Entumeni; *J. Medley Wood*, No. 3987. April, 1888.

Amongst South African species this falls in the section *Copisma*, and comes near to *R. adenodes*, from which plant it differs in size and shape of leaves (which are not resinous dotted), size of flowers, cutting of calyx, and indument.

Helichrysum infaustum Wood & Evans, n. sp. Caules ex radice lignosa, plures, diffusi vel suberecti, simplices vel ramosi, pubescentes, basi nudi, sursum foliosi, 4–8 poll. longi. Folia alterna, sessilia, linearia, obtusa, integra, superne araneoso-lanata, inferne dense albo-tomentosa, 3–8 lin. longa, 1–1½ lin. lata. Cymæ in pedunculis elongatis, globosæ, concinnæ, 50–100-cephalæ, 6–15 lin. diam. Capitula cylindracea, 4–8-fl., 1½ lin. longa, floribus omnibus hermaphroditis, corollis 5-dentatis. Involucrum seriebus pluribus imbricatum, squamis scariosis, fulvis, exterioribus ovatis, interioribus ovato-lanceolatis. Receptaculum planum, foveolatum. Pappum acheniaque non vidimus.

HABITAT.—Natal. Near Van Reenen's Pass, Drakensberg Mts., 5–6000 ped. alt., March; *J. Medley Wood*, No. 6973.

Near *H. hamulosum* E. M., but a smaller and apparently less erect plant, with much smaller cymes and heads, and more woolly leaves which are not "hook pointed." Differs from *H. Kraussii* Sch. Bip. in having all its florets perfect, also in habit and size; and from both in indument of leaves. After examination of numerous heads, we have not been able to find any trace of pappus.

Berkheya latifolia Wood & Evans, n. sp. Herbacea, 1–2 ped. alta, apice racemoso-paniculata. Folia inferiora 12–14 poll. longa, 6–7 poll. lata, ovato-oblonga, basi coarctantia, acuta, petiolata; intermedia minora, angusto-oblonga, decurrentia in utraque parte caulis, superiora rapide diminuentia, crasse crenata marginibus spinosis, obscuris, paucis minutis adpressis pilis supra, infra arachnoidea. Capitula pauca (3 tantum in speciminibus nostris). Pedicelli erecti, 2½–4 poll. longi. Squamæ involucrales 100 vel plures, in pluribus seriebus, diffusæ, rigidæ, marginibus spinosis, glandulis minutis pedicellatis, subtus dense tectæ. Spini 1–2 lin. longi. Radii circa 40, ¾–1 poll. longi, 6–8-striati, bifidi, utroque lobo bifido. Receptaculum profunde foveolatum, cellis apice laceratis, dentibus sæpe longis acuminatis. Achænia glabra. Squamæ pappi paucæ, apice laceratæ, interiores angustiores. Flores lutei.

HABITAT.—Natal. On side of a grassy hill near De Beers Pass, Drakensberg Mts., March, 5–6000 alt.; *J. Medley Wood*, No. 5960.

Berkheya montana Wood & Evans, n. sp. Herbacea, erecta, striata, spinosa, minute pubescens, 3–5 ped. alta. Folia radicalia nulla, caulina oblonga, margine plus minus undulato vel angulato, spinoso-ciliato, superne minute hispida, inferne tenuiter arachnoidea, inferiora 6–9 poll. longa cum petiolo, 3–4 poll. lata. Petioli foliorum inferiorum subamplexicaules nec decurrentes, ¼–½ poll. longi, gradatim diminuentes, foliis superioribus sessilibus. Capitula laxe disposita in corymbis axillaribus terminalibusque ¾–1¼ poll. diam. Squamæ involucrales squarrosæ, lanceolatæ, exteriores longissimæ, spinoso-acuminatæ, margine spinis paucis sparsis in basi concreto, arachnoideæ infra, utrinque dense tectæ glandulis minutis, vena media conspicua, lateralibus supra obscuris. Squamæ exteriores 4–7 lin. longæ, spinum 1 lin. longum includentes. Receptaculum profunde foveolatum, cellis fimbriatis, longis setis acuminatis. Achænia glabra, striata, minute pedicellata. Pappum crateriforme, concretum, uniseriatum, apice laceratum. Flores lutei.

Habitat.—Natal. In a shady valley near De Beers Pass, Drakensberg Mts., 5-6000 ped. alt., March; *J. Medley Wood*, No. 6978.

Chænostoma neglectum Wood & Evans, n. sp. Herba erecta, parce ramosa, pluribus caulibus ex radice lignea, teres, tenuiter sed dense pubescens pilis subfuscis. Folia opposita, sessilia, subamplexicaulia, lineari-oblonga, obtusa, remote et inæqualiter dentata, vena media infra prominente lateralibus obscuris, coriacea, utrinque tenuiter pubescentia, præsertim subtus in vena media, $\frac{3}{4}$–$1\frac{1}{4}$ poll. longa, $\frac{1}{4}$–$\frac{1}{2}$ poll. lata. Flores in racemis axillaribus terminalibusque, simplicibus vel compositis dispositi. Pedunculi $\frac{1}{3}$–$2\frac{1}{4}$ poll. longi. Bractea una basi utriusque pedunculi, subulata. Calyx gamosepalus, 5-partitus, tubo subgloboso, limbo 5-lobato, lobis linearibus, erectis, tenuiter hispidis, 2–3 lin. longis, $1\frac{1}{2}$ lin. latis. Corolla hypocrateriformis, tubo brevi, limbo 5-dentato, lobis æqualibus, integris, diffusis, calyce dimidio vel ultra longiore, roseo, fauce lutea. Stamina quatuor in corollæ fauce, inclusa, subdidynama. Anthera similes, 1-loculares, reniformes margine membranaceo. Ovarium superius, 2-loculare, ovoideum, hispidum. Stylus filiformis, hispidus. Stigma obtusum. Fructus capsularis. Semina numerosa.

Habitat.—Natal: near Charlestown, January, 5–6000 ped. alt.; *J. Medley Wood*, No. 5241. De Beers Pass, Drakensberg Mts., 5-6000 ped., March; *J. Medley Wood*, No. 6032. Orange Free State: near Harrismith, 5-6000 ped. alt., March; *J. Medley Wood*, No. 4817.

This plant is so very common in the localities above named, that it seems strange that it has been for so long undescribed. It appears to prefer the vicinity of cultivated ground, though often times found far from it.

Moræa glauca Wood & Evans, n. sp. Cormus globosus, $\frac{3}{4}$–1 poll. diam., plerumque pluribus minoribus natu parvisque undique collectis. Tunicæ chartaceæ venis prominentibus longitudinalibus, cum venulis obliquissimis transversis, lamina coloris melini, venis venulisque obscure rubro-fuscis, acuminatis. Caulis brevis. Folium basale 6 ped. longum, basi $\frac{3}{4}$ poll. latum, gradatim angustatum ad apicem, sæpe forsan semper flaccidum deorsum 1–3 ped., glabrum, subglaucum, basi numerosas bulbillas parvas includente, 1 vel 2 utroque nodo. Valvæ spathæ 3–5 poll. longæ, cylindraceæ, bi- vel multi-floris, interior longissima, exterior connata, basi plus dimidia longitudine, longe acuminata, virides cum apicibus flaccidis. Perianthium luteum, cum maculis fuscis basi cujusque lobi, vena media conspicua. Segmenta diffundentia, 1–$1\frac{1}{4}$ poll. longa, $\frac{1}{2}$ poll. lata, oblonga, exteriora mucronulata apice, interiora similia sed angustiora, et longitudine subæquale. Filamenta connata $\frac{2}{3}$ longitudine. Antheræ sagittatæ, lineari-oblongæ, extrorsæ, cum connectivo producto. Pollen luteum. Styli spathulati, tenuiter ciliati in margine superiore, cristis lanceolatis, marginibus liberis interioribus in basin stylorum petaloideorum currentibus. Ovarium 3-loculare, obtuse 3-angulatum, ovulis 1 vel 2-seriatis, superpositis, numerosis. Capsula non visa.

Habitat.—Natal. Mooi River district; *J. Medley Wood*, No. 4035.

This plant belongs to the subgenus *Eumoræa* and to the section

Corymbosæ, and comes near to *M. iriopetala*, but differs in size and coating of corms, length of spathe-valves, which are withered at tip, colour of flowers, and shape of perianth-lobes. From *M. mira* it differs by length of leaf, stem and peduncle, colour of flower and pollen, and cutting of style-crests. This is one of the plants called by the Dutch colonists "Tulp" or "Tulip," which are so frequently fatal to cattle; its leaves appear in the early spring when grass is not plentiful, and cattle—I believe especially those from a district where the plant is not found—eat it with fatal results, whole spans of oxen having been killed by it. Probably several species of *Moræa* have the same properties, and are included in the generic name "Tulp."

Aloe Marshalli Wood & Evans, n. sp. Acaulescens, folia producta 20 vel plura, multifaria, erecta, linearia, basi multo dilatata, 1–2 poll. lata, basi gradatim coarctantia 1–2 poll., inde angusto-linearia ad apicem acutum, parte dilatata basi cum maculis minutis albis notatus, parte angusto-lineari, 2–3 lin. lata, non alveata, vena media conspicua, margine parvis dentibus spinosis, inferioribus confertis, superioribus restrictis, pedunculis simplicibus, 1–2 ped. longis, paucis bracteis ovatis cuspidatis scariosis. Flores 15–30 racemosi internodis $\frac{1}{4}$–$\frac{1}{2}$ poll., pedicellis inferioribus $\frac{1}{2}$–$\frac{3}{4}$ poll. longis. Bracteæ oblongo-cuspidatæ, paullo longiores pedicellis. Perianthium cylindraceum, coccineum, præacutum, viride, tubo longo lobis 3–5 lin. longis. Stamina cum stylo inclusa, perianthio subæquantia.

Habitat.—Natal. Rocky hill on the farm "Kelvin Grove," near Glencoe, 4–5000 ped. alt.; *J. Medley Wood*, December, 1896.

This plant seems to fall between *A. Cooperi* and *A. microcantha*; from the former it differs in leaves which are not "tapering gradually to the point," in the length of the pedicels and bracts, colour of flower, and length of perianth-tube. From the latter it differs in texture and shape of leaves, number of empty bracts, looseness of raceme, length of fertile bracts and perianth-tube. Of the latter species, however, we have no specimen with which to compare it. A plant well worth cultivation, having much the appearance when in flower of the well-known *Cyrtanthus angustifolius*.

Kniphofia multiflora Wood & Evans, n. sp. Folia lorata, rigida, cum venis numerosis, margine tenuiter et irregulariter serrulato, 3–4 ped. longa, $\frac{1}{2}$–1 poll. lata. Pedunculi foliis subæquantes. Racemus dense multiflorus, 12–15 poll. longus, subspicatus, cum pedicellis brevibus. Bracteæ lineares, pedicellis longiores. Flores erecti, numerosissimi, 300–400 in racemo luteo. Perianthium subcylindraceum, medio paullo constrictum, $\frac{1}{2}$–$\frac{5}{8}$ poll. longum, 2 lin. latum, segmentis brevissimis tam latis quam longis. Stamina cum stylo valde exserto.

Habitat.—Natal. In a swamp, summit of Drakensberg Mts., between Van Reenen and Nelson's Kop, 5–6000 ped. alt.; *J. Medley Wood*, No. 5972, March, 1896.

Differs from all the other Natal species of the genus known to us by its quite erect flowers, also by its long, narrow, many-flowered raceme.

NOTES ON MYCETOZOA.

By Arthur Lister, F.L.S.

Badhamia ovispora Racib.—Mr. James Saunders, of Luton, discovered this species on old straw at Barton, Beds, on June 5th, 1897. On further search among straw heaps at Stopsley Common, which lies a few miles distant from Barton, when I had the pleasure of being one of the party, more was found, and on July 28th a large gathering was made at the same place by Mr. C. Crouch, of Kitchen End, Ampthill. I am not aware of *B. ovispora* having been previously collected, except the original type obtained by Dr. Raciborski on branches of *Populus canescens* DC. in Poland in 1884 (referred to in *Brit. Mus. Cat. Myc.* 36). I have seen a glycerine preparation of the type in the possession of Dr. Celakovsky, of Prague, and was able to take a camera lucida drawing of the spores, and can therefore vouch for the specific identity of the present gatherings. The sporangia are sessile, hemispherical, about 0·5 mm. diam., usually crowded and confluent, or forming elongate and anastomosing plasmodiocarps. The prevailing colour is white, but some clusters are greyish pink, and others ochraceous. The thick sporangium-wall is very fragile, and composed of remarkably large round granules of lime 1·5–4 μ diam., which separate almost like sand on slight pressure; the calcareous outer crust rests on a delicately membranous layer enclosing the spores. The capillitium consists of large irregularly-shaped lime-knots, often connected by broad tubes filled with lime-granules, and uniting to form a columella at the base of the sporangium; sometimes the columella is wanting, and the capillitium is more regular in form with true *Badhamia* character, but it is here and there reduced to slender hyaline threads. The lime-granules filling the knots are of the same structure as those in the sporangium-wall, and crumble down almost at a touch. The spores are strikingly characteristic of the species; they are free, and vary in shape from ellipsoid to nearly globose; they measure from 10 to 16 μ by 8 to 10 μ diam., and are perfectly smooth as seen under a magnifying power of 1600 diam. A ridge or fold runs along one side in the direction of the long axis, and often gives the appearance of an apiculus at the two ends. On drying, the spores contract on the side marked by the aforesaid ridge, and take a boat-shaped form; when viewed under a moderate magnifying power, they sparkle like glass beads, reflecting the light from their polished surfaces; the colour is olive-brown with a purplish tinge.

In several species of *Physarum*, especially in *P. compressum*, we are accustomed to meet with a vitreous condition of the lime on the sporangium-wall; it appears to be in consequence of exposure to rain, and is alluded to in *B. M. Cat.* 54. The solution of the lime-granules and subsequent crystallization is a striking feature in *B. ovispora;* in some cases the sporangium is almost covered with irregularly-shaped crystalline nodules about 40–50 μ diam.

The examination of old straw heaps in open fields has lately yielded remarkably rich results, and I hope shortly to offer some remarks on interesting species of *Physarum* and *Didymium* found in great abundance in these localities, and exhibiting unusual characters. It would be well if those who are interested in these organisms would investigate such straw heaps during the summer and autumn.

× POTAMOGETON FLUITANS IN HUNTINGDONSHIRE.

By Alfred Fryer.

Shortly after the discovery of *P. fluitans** in a small pit by the side of the forty-foot, or Vermuyden's Drain, in Ramsey parish, the pit was used as a receptacle for rubbish from a neighbouring cottage. Foreseeing thence the probability of the plant soon becoming destroyed in its sole locality in Huntingdonshire, I planted some roots in a recently-dug pit near Warboys Wood. Although the subsoil of the pit was Oxford Clay like that of the Ramsey locality, the plants did not thrive for some years, probably from the want of the decayed vegetable mud which forms the lower stratum of the woody ponds in which Potamogetons flourish. Time, however, remedied this defect, and two years ago I saw that the roots began to spread a little about the pond.

In July of the present year I again visited the Warboys locality, and to my delight found a mass of *P. fluitans* extending over some forty square yards, or more. As the species had already been extinct as a native plant in Huntingdonshire for nearly ten years, I felt that in following Mr. H. C. Watson's advice of "helping" a plant to live, I had done well; and the plant being beyond all danger of extinction by any number of collectors, the time had come when a notice of the introduction became necessary in this Journal.

On August 19th I was at the original locality in the parish of Ramsey, and found no trace of any *Potamogeton* whatever in the little pit by the forty-foot drain, but some fifty yards away I saw a new pit had been dug since my last visit in 1895. In this new pit to my surprise I found some beautiful seedling forms of *P. natans*, with lanceolate, oval, and round floating leaves, sufficient to afford examples of several named "varieties," but unfortunately all growing on *one rootstock* in the instance in which the "varieties" were most marked! At one end of the pit a plant of *natans* was growing which looked older and more thoroughly established, and with much the look of *fluitans* about the mass of foliage. On closer inspection I found several plants of *fluitans* were really mixed up with the *natans*, and that native, *unhelped* specimens of Huntingdonshire *fluitans* were still existing!

Now from whence did these plants come? My former suggestion (*Journ. Bot.* 1886, 307) that the species was brought down from the upland waters of the county has received no support from an examination of the only brook which runs into the forty-foot.

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* *Journn. Bot.* 1888, 277.

Although that brook is the source of *P. natans* in this locality, no plants of *P. fluitans* have been found in it, in spite of repeated and careful examination. Again, no floods have occurred recently such as could have washed roots or seeds from the upland water into the new pit.

I think the question of the reappearance of *P. natans* itself, letting alone *fluitans* for the moment, in this restricted locality is only to be explained in one way—by the rootstock having survived in the soil, made damp by winter floods, for many years without having been able to push up stems or leaves; certainly none have been seen during the fifteen years I have visited the spot, which has been perfectly dry in summer and grazed over by cattle.

Now if we allow that a strong rootstock of *P. natans* managed to survive in the dried-up mud and clay for some years, we only add another instance to many which are familiar to all fen-men of the persistent vitality of buried roots of water-plants.

To return to *P. fluitans*:—the fact of most interest to me is that it remains quite unaltered in both localities, it is exactly as it was fourteen years ago, no variation whatever has taken place; and as I have never yet seen forms of *P. fluitans* from any two localities, however near to each other, exactly alike, I can come to only one conclusion —that the reappearance of *P. fluitans* in the original locality is due to a long-buried rootstock. Probably when the locality at Ramsey was constantly under water, as it was prior to 1848, the original seedling × *P. fluitans* covered a considerable space, as the transplanted roots now do at Warboys.

In habit of growth *P. fluitans* keeps very distinct from my *P. crassifolius*, which I still think a hybrid with *Zizii* as one parent instead of *lucens*. Where *Zizii* does not grow we find only the typical *P. fluitans!* *

REPORT OF DEPARTMENT OF BOTANY, BRITISH MUSEUM, 1895.†

By George Murray, F.R.S.Ed.

The collections have been enriched during the year by several especially noteworthy additions.

Mr. Arthur Lister has added to his previous gifts the further one of 832 microscope slides of Mycetozoa and 397 herbarium specimens, as well as 112 exhibition specimens and 36 coloured drawings by Miss Gulielma Lister to illustrate the British representatives of this group. The latter series have been placed in a table-case in the gallery.

A collection of nearly 3000 drawings of British Fungi by Mr. Edwin Wheeler, of great botanical value, has been generously presented by Messrs. Edwin and Henry Wheeler. The drawings are of particular importance as accurate records of the colour characters of the larger Fungi, which are so difficult to preserve suitably in a herbarium.

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* Since the above was written, rootstocks of both species have been found (August 27th) under conditions confirming the view advocated.

[† This was accidentally omitted from our last year's volume; we print it now in order that the series may not be incomplete.—Ed. Journ. Bot.]

A present of much value and interest, consisting of 146 microscope slides, illustrating his researches on Archegoniate plants, has been made by Professor D. H. Campbell, of the Leland Stanford University, California.

The other additions to the collections by presentation have consisted of 94 plants from Kolguev Island, by A. Trevor Battye, Esq.; 12 specimens of tropical fruits and palm foliage, and 2 species of *Cordyceps*, by H. N. Ridley, Esq.; 4 species of cultivated orchids, by Miss Woolward; 213 specimens of East African plants, by F. J. Jackson, Esq.; 748 Indian plants and specimens of aërial roots of Sunderbund plants, by Dr. King, Botanic Garden, Calcutta; 246 specimens of East African plants, by Dr. Donaldson Smith; 4 specimens of cultivated orchids, by Messrs. Veitch; 739 plants from Kashmir, by J. F. Duthie, Esq.; 89 North American plants, by A. Davidson, Esq.; 25 plants from Great Salvage Island, and 11 from Great Piton, by W. R. Ogilvie Grant, Esq.; 41 plants from West Tropical Africa, by Captain Lugard; 4 plants from Ceylon, by Dr. Trimen; 101 plants from North America, by Professor Robinson; 101 plants from North America, by Professor Macoun; 36 Cryptogams from British Guiana, and specimens of Urari poison ingredients, by J. J. Quelch, Esq.; 185 plants from North California, by Professor E. L. Greene; 16 specimens of *Malvaceæ* from South Africa, by E. E. Galpin, Esq.; 23 plants from the Pamirs, by the Rev. J. Gerard; 42 plants from Australia, by Spencer Moore, Esq.; 3 specimens of cultivated orchids, by James O'Brien, Esq.; 59 North American Lichens, by Professor Farlow; 29 Cryptogams from Ceylon, by E. E. Green, Esq.; 11 American and 13 Japanese *Characeæ*, by Dr. T. F. Allen; 48 Algæ from the Cape of Good Hope, by Miss Newdigate; 63 Algæ from the Cape, by W. Tyson, Esq.; 17 Algæ from the Cape, by the late Professor Schmitz; 15 Algæ from South Australia, by Baron von Mueller; 30 Californian Algæ and 6 photographs of the same, by W. R. Shaw, Esq.; 52 Cryptogams from India, by Dr. T. Cooke; 3 Algæ, by Major Reinbold; specimens and slides of *Neomeris*, by A. H. Church, Esq.; 2 Algæ from the Cape, by Professor E. Perceval Wright; a gathering of *Diatomaceæ* from Trinidad, by the Director of the Royal Gardens, Kew; 2 Australian Fungi, by Miss Dymes; and single specimens, by E. M. Holmes, Esq., Dr. Lange, F. W. Moore, Esq., Professor Cramer, Miss Pigou, Mevrouw Weber van Bosse, W. W. Strickland, Esq., and Surgeon-Captain A. Alcock.

The following additions have been made by presentation to the British Herbarium:—431 specimens by the Rev. E. S. Marshall; 21 specimens by Captain Wolley Dod; 3 specimens by W. Whitwell, Esq.; 12 specimens by Clement Reid, Esq.; 11 specimens by the Rev. E. F. Linton; 9 specimens by Professor D. Oliver; 3 specimens by R. F. Towndrow, Esq.; 108 specimens by W. A. Shoolbred, Esq.; 2 specimens by the Rev. Augustin Ley; 50 specimens by T. Wulff, Esq., for the exhibition series of British plants; 3 Mosses by Mrs. Tindall; 10 Algæ by G. Brebner, Esq.; 2 Fungi by Miss Beatrice

Heathcote; 2 Fungi by Lord Walsingham; 20 rare Staffordshire Mosses by J. E. Bagnall, Esq.; and single specimens by Sir Hugh Low, W. P. Hiern, Esq., David Robertson, Esq., J. C. Mansel-Pleydell, Esq., and H. Wigley, Esq.

The following additions have been made by exchange of duplicates:—442 specimens of Tropical African plants, and a specimen of *Pleurocladia palustris* from the Director of the Royal Botanical Museum, Berlin; specimens of the fruits of *Dion edule* and *Zamia* from Professor Penzig; 2 new species of *Disperis* from Dr. Schlechter; and 159 slides of Hepaticæ from Mrs. Tindall.

The first half, consisting of 5000 specimens, of the Stephani collection of Hepaticæ has been acquired by purchase. A very large number of these are type specimens, since Dr. Stephani has described nearly every important foreign collection during the last twelve years. This purchase has greatly enriched an important section of the Herbarium, and, happily, at a time when increased study is being given to the characteristics of the Hepaticæ.

The following collections have also been acquired by purchase:—100 specimens of *Potamogeton*, collected by Tiselius; 96 specimens of South African plants, collected by Schlechter; 1233 plants and 68 woods from Kilimanjaro, collected by Volkens; 348 South Texas plants, collected by Heller; 208 Persian plants, collected by Bornmüller; 302 Mexican plants (Provinces Colima and Sonora), collected by Palmer; 200 Borneo plants, collected by Haviland; 400 Polish plants, collected by Rehman and Woloszczak; 300 plants from Asia Minor, collected by Sintenis; 113 plants from Natal, collected by J. M. Wood; 384 plants and 3 wood specimens from Formosa, collected by Henry; 429 Mexican plants, collected by Pringle; 297 plants from the Sandwich Islands, collected by Heller; 118 plants from Bulgaria, collected by Stribrny; 251 Bolivian plants from Rusby; 50 British plants (Willows and Rubi) from the Rev. E. F. Linton; a specimen of *Flemingites* from Sherborn; 50 specimens of Fungi from Cavara; 350 Fungi from Sydow; 100 Fungi, principally Australian, from Cooke; 100 Russian Fungi from Jackzewski, Komarov, and Transzchel; 100 Brazilian Mosses from Ule; 88 Mosses of Newfoundland and Labrador from the Rev. A. C. Waghorne; 150 North American Algæ from Collins, Holden, and Setchell; 61 slides of Algæ from Buffham; 200 Fungi from Pazschke; 100 Scandinavian Fungi from Eriksson; 50 Fungi from Seymour and Earle; 17 *Uredineæ* from Holway; 50 North American Mosses from Renault and Cardot; and 100 Fungi from Krieger.

There have been added to the collection of prints and drawings 24 original drawings by Sydenham Edwards for "The New Botanic Garden," 3 drawings by Mrs. Withers, and 1 by Fitch.

A manuscript journal of Sir Joseph Banks' voyage to Newfoundland and Labrador in 1766 has been acquired by purchase. The journal is in the handwriting of Sarah Sophia Banks, the sister of Sir Joseph.

REPORT OF DEPARTMENT OF BOTANY, BRITISH MUSEUM, 1896.

BY GEORGE MURRAY, F.R.S.

THE late Freeman C. S. Roper, of Eastbourne, for many years an authority on *Diatomaceæ*, has greatly enriched the collections by the bequest of his cabinet of Diatoms, consisting of 3580 slides, 2 type slides, and 41 herbarium specimens. Mr. Roper's collection had been long known as one of the best private cabinets, since it contains much material prepared under his special direction. It has proved to be of great value even as an addition to the magnificent series of slides already in the Department.

The Linnean Society has presented 3705 specimens of Fungi and Lichens (from Weddell's Herbarium), and the gift has made it possible to complete published sets by E. Fries, Mougeot and Nestler, Stenhammar, Th. M. Fries, Hepp, Anzi, and Malbranche.

The other additions to the collections by presentation have consisted of 841 Malayan Phanerogams and Cryptogams, 345 woods and 1 fruit by H. N. Ridley, Esq., Director of Gardens and Forests, Singapore; 453 Indian plants by Dr. George King, C.I.E., F.R.S., Superintendent of the Royal Botanic Garden, Calcutta; 352 Kashmir and 100 Pamir plants by J. F. Duthie, Esq., Director of the Botanic Garden, Saharunpur; 84 Cryptogams and 1 fruit by the Honourable William Fawcett, Director of Public Gardens and Plantations, Jamaica; 3 plants by J. H. Hart, Esq., Superintendent, Royal Botanic Gardens, Trinidad; 135 South African plants by the Government of Cape Colony; 74 African Fungi and 3 fruiting specimens of Flowering Plants by W. T. Thiselton-Dyer, Esq., C.M.G., C.I.E., F.R.S., Director, Royal Gardens, Kew; 11 Insectivorous plants by Professor Balfour, F.R.S., Director of the Royal Botanic Garden, Edinburgh; 24 North American and Mexican plants by the Director of the National Herbarium, Washington; 435 African plants by the late John Buchanan, Esq., C.M.G.; 8 specimens by Messrs. Veitch; 93 North American plants by Professor Macoun; 240 Canadian Phanerogams and Cryptogams by J. M. Macoun, Esq.; 25 plants from Kolguev by Colonel Feilden; 34 European plants by Dr. Christ; 248 Chinese Phanerogams and Cryptogams and 30 fruits by Father Hugh; 17 American Willows by W. W. Rowlee, Esq.; 300 Phanerogams and Cryptogams from British North Borneo by his Excellency the Governor Creagh, C.M.G.; 70 South African plants by H. Bolus, Esq.; 74 Nyasaland plants by the Universities Mission; 2 photographs of Mexican vegetation and 2 Fungi by O. H. Howarth, Esq.; 2 photographs of *Hakea grammatophylla* by G. H. Adcock, Esq.; 3 specimens and drawings by Professor Bailey; 6 Orchids by F. W. Moore, Esq.; 4 species of *Dombeya* by Dr. Cordemoy; 2 Canarian plants by the Rev. R. P. Murray; 3 New Zealand plants by T. Kirk, Esq.; 21 Orchids by J. Weathers, Esq.; 27 West Australian plants by W. Fraylen, Esq.; 17 microscope slides of Cryptogams by C. D. Sherborne, Esq.; 300 New Zealand Musci and Hepaticæ by F. T. Mott, Esq.; 3 Tasmania Mosses by W. A. Weymouth, Esq.; dried and spirit specimens and 4 microscope slides of a new genus of Hepaticæ by Professor D. H. Campbell; 23 Cape Algæ by W. Tyson; 73 Cape Algæ by H. G. Flanagan, Esq.; 3 Cape Algæ and specimen of a new variety of Jaborandi by E. M. Holmes, Esq.; 25 Australian Algæ by the late Baron von Mueller, K.C.M.G.; 75 Grand Canary Algæ by Miss Anna Vickers; 12 Crimean Algæ by Miss Nathalie Karsakoff; 18 slides of Plankton Diatoms by Professor Cleve; 2 Algæ by Surgeon-Captain Alcock; 14 Antiguan Mycetozoa by W. Cran, Esq.; 17 photographs of Indian Fungi by Dr. Alfred Lingard; and single specimens by Graf zu Solms-Laubach, Professor F. W. Oliver, Captain Meryon, R.N., Rev. C. H. Binstead, and W. Horace Wood, Esq.

The following additions have been made by presentation to the British Herbarium:—342 plants by the Rev. E. S. Marshall; 76 plants by Arthur Bennett, Esq.; 38 plants by A. B. Jackson, Esq.; 20 Montgomeryshire plants by W. Whitwell, Esq.; 6 plants by T. Hilton, Esq.; 2 plants by Miss Boyd; 5 Insectivorous plants by Professor Trail; 2 Leicestershire plants and 200 Musci and Hepaticæ by F. T. Mott, Esq.; 1 rare Moss and 2 microscope slides by W. E. Nicholson, Esq.; 11 Algæ and 6 slides by George Brebner, Esq.; 18 Fungi by C. B. Plowright, Esq.; 11 Fungi by Miss A. L. Smith; 3 Fungi by C. F. Jenkin, Esq.; 2 Fungi by Cedric Bucknall, Esq.; and single specimens by J. Lloyd Williams, Esq., Rev. E. A. Woodruffe Peacock, Mrs. Marindin, Rev. E. D. Heathcote, Rev. C. H. Binstead, Miss A. H. Fisher, and W. H. Shrubsole, Esq.

The following additions have been made by exchange of duplicates:—928 Phanerogams and Cryptogams from the Cameroons and the Argentine Republic, from the Director of the Royal Botanical Museum, Berlin; 597 Minnesota plants from Professor Conway Macmillan; and specimens in spirit of 2 parasites for exhibition from Professor Penzig.

The second (concluding) portion of the Stephani collection of Hepaticæ has been acquired by purchase. It consists of 6920 specimens, and is in every respect a most satisfactory addition to the Herbarium.

Two small Herbaria of Algæ of much value were also purchased, *viz.* that of the late T. H. Buffham, consisting of 1330 specimens, chiefly from British coasts; and that of the late Bracebridge Wilson, containing 1485 Victoria specimens. Both collections were the fruit of careful and assiduous work during many years.

The following specimens have also been acquired by purchase:—1334 Phanerogams and Cryptogams, from "the Sequoia region," by Hansen; 1254 Phanerogams and Cryptogams, from North America, by Marcus E. Jones; 529 Phanerogams and Cryptogams, from Madagascar, by Dr. Forsyth Major; 340 Chinese plants, by Father Hugh; 100 Lombok plants, by Everett; 239 Armenian plants, by Sintenis; 100 Polish plants, by Woloszczak; 276 French Congo plants, by Bates; 249 Hawaiian plants, by Heller; 100 plants from Greece, by Heldreich; 108 Bornean plants, by Haviland; 225 Mexican plants, by Pringle; 280 Mexican plants and 22 fruits, by Palmer; 79 Yucatan plants, 377 Orinoco plants, by

Rusby; 442 Persian plants, by Bornmüller; 644 Cryptogams, by Beattie; 200 Swiss Cryptogams, by Wartmann and Winter; 50 Swiss Cryptogams, by Wartmann and Schenk; 185 Labrador Mosses, by Waghorne; 206 Labrador and Newfoundland Lichens, by Waghorne; 48 Florida Algæ, by Curtiss; 50 North American Algæ, by Collins, Holden, and Setchell; 100 Algæ, by Hauck and Richter; 25 *Characeæ*, by Migula, Sydow, and Wahlstedt; 350 Fungi, by Sydow; 163 Mecklenburg Fungi, by Fiedler; 200 Scandinavian Fungi, by Romell; 1000 Fungi, by Ellis and Everhart; 25 Parasitic Fungi, by Briosi and Cavara; 50 Lombardy Fungi, by Cavara; 50 Russian Fungi, by Jaczewski, Komarov, and Tranzschel; and 100 Fungi, by Krieger.

SHORT NOTES.

MOBILITY OF ANTHEROZOIDS OF DICTYOTA AND TAONIA. — While working at the fertilization of the *Fucaceæ* last summer, I collected male and female plants of *Dictyota dichotoma* Lamx., and carried out experiments with the view of deciding whether there was a process of fertilization in this case, or merely of parthenogenesis. On one occasion the so-called *spermatia*, or *pollinoids*, were observed in active motion, their behaviour being similar in all respects to that of the antherozoids of the *Fucaceæ*, excepting that they came to rest much sooner. This phenomenon was seen late in September, towards the close of the fruiting season of *Dictyota*, and in consequence of the lateness of the season I was unable to observe it again. Though strongly urged to publish the observation, I thought it better to wait until ample proofs were secured before doing so. They have now been obtained, and experiments made during the present month (August) have confirmed in every respect the conclusions arrived at last September. Male plants of *Dictyota* with mature antheridia obtained at Holyhead were carefully isolated at the time of collection, and kept moist. In the laboratory, fragments were placed in clean sea-water, either in glass capsules or on slides. In each case the antherozoids immediately appeared, swarming in the water and exhibiting as great activity as those of *Fucus*. On focussing the microscope on the surface of a sorus the antherozoids could clearly be distinguished starting into activity and leaving the antheridia. Specimens were fixed and stained. These show clearly the structure of the bodies and cilia of the spermatozoids, and in this respect a striking difference is at once observable between them and those of the *Fucaceæ*. Details respecting these points, observations on the conditions affecting their maturation, liberation, and mobility, together with the results of experiments on the fertilization and germination of the oospheres, will be published at an early date. While this work was in progress, antheridial plants of *Taonia atomaria* J. Ag. were collected at Llandudno, and treated in the same manner as *Dictyota*. In this case also the antherozoids were actively motile. It is evident that the above observations have an important bearing on the position of these plants among the *Phæophyceæ*.—J. Lloyd Williams.

Salix cernua Linton.—In my paper on the "Salix Lists in the *London Catalogue*" (*Journ. Bot.* 1896, 461), I omitted any reference to *S. cernua*, no fresh light having been shed on its origin since the description was written (*Journ. Bot.* 1894, 202). This year the Rev. W. R. Linton and myself were at Braemar in July, and happily re-discovered the original plant on a rocky slope of the Little Craigindal, and a fair amount of specimens were procurable for our Set of British Willows. A doubt had been raised by the late Dr. F. B. White whether *S. repens* L. ascended to the altitude, about 2100–2200 ft., at which the hybrid occurred; and, though I felt little doubt that I had *S. repens* from such an elevation, and the *Student's Flora* says it "ascends to 2500 ft. in the Highlands," there was no evidence to show its presence in the neighbourhood of the Little Craigindal rocks. It was therefore a great satisfaction to me to find *S. repens* growing close by the plant of *S. cernua*, and interesting to see plants of it flourishing on rocky ledges, a situation in which I do not remember to have noticed it before. We kept a sharp look-out for *S. Lapponum* L., as that had formerly been suggested to me as the probable co-factor with *S. herbacea* in making the hybrid; but it was nowhere seen along the whole length of the rocks. The prevailing willow was *S. Myrsinites* L., which was frequent, and presented some variation of leaf. A hybrid should occur here between *S. Myrsinites* and *S. repens*, in one spot growing in close proximity; and this should be looked for in future years, though it does not seem to have been developed as yet. I gave my reasons when describing *S. cernua* for distinguishing between it and *S. herbacea* × *Myrsinites*: a plant of the latter, unmistakable, though male, was detected by the Rev. W. R. Linton on the same rocks during our visit in 1889, and cultivated specimens of this will go out in the same fascicle with *S. cernua*, for the sake of comparison and contrast.—E. F. Linton.

Potentilla norvegica L. in Surrey. — I noticed some plants of this species by a pond near Box Hill in June. *Camelina sativa* occurred on gravel near Dorking.—G. C. Druce.

Caucalis nodosa Scop. — This plant, which usually occurs on sunny banks, I noticed recently in great plenty in a clover-field between Little Brickhill and Water Eaton, in Buckinghamshire. Here it had much of the habit of *C. arvensis*. The umbels, especially the lower ones, were shortly stalked.—G. C. Druce.

Vicia villosa Roth, var. glabrescens Koch. — My friend the Rev. H. J. Riddelsdell has sent me a vetch which he tells me is found in some quantity on heaps of rubble near Aberdare. This I find to be the plant above named; it has much resemblance to *V. Cracca*, but the prolonged and almost gibbous base to the petals at once distinguishes it from that species. *Asperula arvensis* occurs in the vicinity.—G. C. Druce.

NOTICES OF BOOKS.

Flore Populaire, ou Histoire Naturelle des Plantes dans leurs rapports avec la Linguistique et le Folklore. Par EUGÈNE ROLLAND. Tome I. [*Ranunculaceæ—Cruciferæ*]. Librairie Rolland, Paris. 8vo, pp. iii, 272. Price 6 fr.

AN undertaking which must have suggested itself to many besides the writer of this notice is now being executed by one whom previous work in kindred matters has shown to be fully competent for the task. M. Eugène Rolland has already issued the *Faune Populaire de la France* (1877–83), the six volumes of which contain the popular names and folklore connected with the beasts and birds (wild and tame) and other living creatures of his native country; now that he comes to deal with the vegetable world he has taken a wider range, extending his researches to the plants of the countries of Europe, as well as of Western Asia and Northern Africa.

M. Rolland's book shows how vast is the popular nomenclature of plants, although at the same time it demonstrates the hopelessness of any attempt to record such nomenclature exhaustively. The list of authors cited, with the abbreviated titles of their books, occupies fourteen closely printed pages, and includes writers of all classes, from the Latin and Greek authors down to the present day. No language comes amiss to M. Rolland, but we could wish that he had given translations of the Polish, Hungarian, Arabic, and other names from languages with which most of his readers will hardly be familiar. Such translations are often appended to the Welsh citations, greatly to the advantage of the student who likes to trace the connection of one name with another. The old herbals and glossaries have been ransacked, and their numerous contributions are duly catalogued.

French names naturally predominate; many of them, says the author, "nous avons été chercher nous-même dans ce puits sans fond qu'on appelle la Tradition orale." No one who has not attempted to collect such information has any idea of the number of popular names still extant among the people, in spite of the advance of what is called education. Thanks to the English Dialect Society (whose work has been, we think, somewhat too abruptly terminated, in consequence of the issue in parts of the *English Dialect Dictionary*), we have readily accessible a vast store-house of information regarding the folk-speech of our country; but it is certain that the gleaner in such fields will yet find many stray ears ready to his hand, sufficient, indeed, to make no inconsiderable sheaf.

M. Rolland has mainly followed (although by no means exhaustively) the Dialect Society's *Dictionary of English Plant-names* for the popular nomenclature of this country, supplemented here and there by references to more recent works. Many local floras—such as Mr. F. A. Lees's *West Yorkshire*—would have supplied him with important additions, and the manuscript Supplement to the *Dictionary of Plant-names*—now, through the disruption of the

Society, indefinitely postponed—contains a large number collected from various sources. Here and there among M. Rolland's English names we note an error or an omission: thus, the *Bon Jardinier* Almanack for "the year XIII." notwithstanding, we cannot allow that the "ten week stock" is synonymous with the wallflower, and it is odd to find that a name in such general use as "Virginia stock" is not recorded for *Malcomia maritima.* Sometimes names distinctly applicable to only one species are assigned to the genus, as when "snow in summer" and others are placed under the genus *Arabis* instead of under *A. alpina*, and "coral-wort" and the like are recorded under *Dentaria* instead of under *D. bulbifera.* At times we are inclined to doubt the accuracy of M. Rolland's generalizations, as when he says of *Ranunculus arvensis*, "Cette plante porte souvent les mêmes noms que les renoncules précédentes" (our three buttercups); certainly in England this species has a very distinct series of names, and its place of growth, spiny carpels, and general appearance sufficiently prevent it from being popularly regarded as one of the buttercups. The English names correspond curiously with some of those of other countries: thus the adhesion to the hands of the reapers which has gained for it our names "devil's claws," "hedge-hog," and "crows' claws" is echoed in France by "gratons," "chinot (petit chien)," and "goussés = chiens"; "les fruits sont ainsi appelés parce que leurs piquants les font adhérer aux talons nus des paysans et s'y attachent comme des chiens qui mordent." The dialectal French "bramefouam—c'est à dire qui appelle la faim, parce que cette plante fait le plus grand tort aux récoltes"—is paralleled by our "hunger weed" and "starve-acre." This last name is not given as English by M. Rolland; and a comparison of his list with that in the *Dictionary of English Plant-names* shows that of the twenty-eight names there given for *Ranunculus arvensis*, M. Rolland cites only fourteen, so that he has hardly done justice to his English material.

M. Rolland has been wise in excluding the rubbish in the way of spurious legend and tradition which is to be found in many "popular" books, but we are inclined to think that the folklore of the various species might be considerably extended. What there is, however, is genuine and interesting. It is curious to find that the popular superstition by which English nurses prevent their charges from gathering dandelions is about Liège transferred to buttercups, and in Languedoc to poppies; our children's game (which M. Rolland does not mention) of holding a buttercup under the chin, to see by the reflection "if you like butter," has a variant in Denmark, where, "si en touchant la menton de la ménagère avec une renoncule, il y reste des traces jaunes, elle réussira son beurre dans le courant de l'année." M. Rolland does not always steer clear of ingenious derivations; he thinks our English name poppy comes from "poupée" and relates to the dolls which French children make out of the flowers—an amusement "connue presque partout," he says, but which we have not met with in England. This is how it is done, according to Madame de Genlis:—"On fait du coquelicot bien épanoui une charmante petite poupée. Les pétales font l'habillement et les bras, au moyen des fils qui les rattachent. La petite tête fait le visage; le haut de cette tête forme une calotte; les étamines font une jolie fraise ou collerette autour du visage." To which M. Rolland adds: "les pétales doivent être retournés et ramenés du côté de la tige, et on fait les jambes avec deux brins de graminées."

M. Rolland's book is a valuable contribution to the popular natural history of plants, and we trust it will steadily proceed to its completion.

James Britten.

Neue Kalkalgen von Deutsch-Neu-Guinea. Von F. Heydrich. (Bibliotheca Botanica. Heft 41.) Stuttgart: Nägele. 1897. Price 6 Marks. Pp. viii, 11; 1 tab., 1 text-figure.

Under the general name of *Bibliotheca Botanica*, edited by Professors Luerssen and Frank, there have appeared at irregular intervals and at varied prices a series of original communications by all sorts of authors upon all sorts of botanical subjects. The present monograph on the calcareous algæ of Kaiser Wilhelm's Land, or German New Guinea, forms the concluding part of Band vii., and is remarkable for the liberal allowance of titles which it displays in proportion to text. Thus there is the title-page proper of the monograph; also that of Heft 41, which is duplicated on the cover; and finally that of Band vii. of the *Bibliotheca Botanica*, followed by a page of contents. These "outward limbs and flourishes" are no doubt essential to the book as a whole, but they occupy nearly half the present publication. The remaining text, however, is sufficiently solid and condensed to satisfy the most exacting algologist. Four new species of *Lithothamnion* (*L. tamiense*, *L. pygmæum*, *L. Bamleri*, *L. onkodes*) are described in full, and two others incompletely known are indicated without name. Three other new species described are *Lithophyllum fibulatum*, *Peyssonnelia tamiense* [sic!], and *P. calcarea*. Of most of these plants life-size photographs, reproduced by collotypy, are provided, and give us a true conception of the external appearance of these calcareous seaweeds. Growing as many of them do on coral-reefs, the coralline algæ are liable to be mistaken for true corals; and as time and investigation proceed we are likely to have several additions to the species.

A. G.

Nature-Chat. By Edward A. Martin, F.G.S. London: R. E. Taylor & Son. 8vo, pp. 141. Price 1s.

This is an example of the kind of volume which is put forward in these bookmaking days by well-meaning persons who assume the teacher's chair when they should occupy a place on the learner's form. Mr. Martin's observations are at best trivial; they are sometimes inaccurate, as well as inconsistent. For example, he says (p. 14) that "the eight-rayed yellow disc" of the lesser celandine is, "our botanical friends tell us, not a corona of petals as one might think, but a calyx of sepals, beneath which appear three bracts." Mr. Martin is not fortunate in his "botanical friends," and we demur to his application of "disc" and "corona" in this context—perhaps "corona" is a misprint for "corolla"?—but what we wish to point out is that, after this piece of information, he tells us (p. 26) that "the lesser celandine has always at least eight petals!" His botany, indeed, needs revision, for in this same note, having told us that "the buttercup tribe is a very puzzling one" (which, if we except the *Batrachium* section, is hardly the case), he proceeds to differentiate our common species without any reference to the character afforded by the calyx. He speaks (p. 34) of the "blossom" of a grass when he means its inflorescence, and of "chestnut trees" (p. 106) when horse-chestnuts are intended. There is a tendency to fine writing, as when dead nettles are termed "gorgeous" (p. 51) and "magnificent" (p. 7); and an entire absence of anything like style. But the main defect of the book is its triviality: what is to be learned from such Ollendorffian sentences as "I met with an ichneumon-fly this morning in my garden. The everlasting-pea is just commencing to be in bloom." Mr. Martin no doubt has a genuine love for nature, and his efforts to induce others to share his enthusiasm are deserving of praise; but we cannot think he was well advised in printing in book form the miscellaneous paragraphs which make up *Nature-Chat.*

*ARTICLES IN JOURNALS.**

Bot. Centralblatt (Nos. 31–33). — F. Kuhla, 'Ueber Entstehung und Verbreitung des Phelloderms.' — (No. 34). F. M. Ludwig, 'Beiträge zur Phytarithmetik.'—N. J. Kusnezow, 'Edmund Russow' (24 Feb. 1841–11 April, 1897).

Bot. Gazette (31 July).—R. Thaxter, '*Syncephalastrum* and *Syncephalis*' (2 pl.). — H. J. Webber, 'Development of antherozoids of *Zamia*.' — E. W. D. Holway, 'Mexican Fungi' (*Podosordaria*, gen. nov.). — W. M. Kozlowski, 'Contribution to theory of movements of Diatoms.' — J. M. Coulter & J. N. Rose, 'Revision of *Lilæopsis*' (*Crantzia*).—K. M. Wiegand, *Euphorbia hirsuta* (1 pl.).

Bot. Zeitung (16 Aug.). — F. Hegelmaier, 'Zur Kenntniss der Polyembryonie von *Allium odorum*' (1 pl.).

Bull. de l'Herb. Boissier (Aug.). — R. Keller, 'Hypericineæ Japonicæ.'—G. Lindau, 'Acanthaceæ americanæ et asiaticæ.' — H. de Boisdieu, 'Les Saxifragées du Japon.' — R. Chodat, 'Sur deux Algues perforantes de l'Ile de Man.'

Bull. Torrey Bot. Club (29 July). — A. Hollick, *Anomalophyllites Bridgetonensis*, n. sp. (3 pl.).—J. K. Small, 'Studies in the Botany of the South-eastern United States.' — G. V. Nash, 'New or noteworthy American Grasses.'

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Erythea (30 June). — A. Eastwood, '*Coniferæ* of Santa Lucia Mountains.' — W. L. Jepson, 'Dr. William P. Gibbons' (Ap. 12, 1812–May 17, 1897). — (23 July). K. Brandegee, 'Notes on *Eriogoneæ*.'—C. P. Nott, 'Parasitic *Florideæ* of Californian Coast.'

Gardeners' Chronicle (24 July). — *Stapelia cupularis* N. E. Br., sp. n.—(14 Aug.). *Eriopsis Helenæ* Kränzl., sp. n.

Journal de Botanique (16 July). — A. Franchet, '*Isopyrum* et *Coptis*' (concl.). — P. van Tieghem, 'Ovule et graine chez les Hydnoracées.'—E. Bonnet, 'Sur quelques hybrides.'

Oesterr. Bot. Zeitschrift (Aug.). — F. Krasser, 'Constantin Freiherr von Ettingshausen' (16 June, 1826–1 Feb. 1897: portr.).— E. v. Halácsy, 'Beitrag zur Flora von Griechenland.' — J. Bornmüller, '*Calamagrostis Lalesarensis* Torg. & Bornm., sp. n.' — V. Schiffner, 'Bryologische Mittheilungen aus Mittelböhmen.'

BOOK-NOTES, NEWS, &c.

M. Chodat contributes to the *Bulletin de l'Herbier Boissier* for August a paper "Sur deux Algues perforantes de l'Ile de Man," which he collected during the visit of the British Association to that island last year. He describes two new species, *Gomontia manxiana* and *Hyella voluticola*, and refers Hariot's *Siphonocladus voluticola* to *Gomontia*.

Prof. Kranzlin announces for publication, under the title *Orchidacearum Genera et Species*, a complete enumeration of the *Orchidaceæ*. The work will occupy six volumes, the first of which, containing the *Cypripedieæ* and *Ophrydeæ*, is already in print.

Dr. Albert Schneider has prepared a new *Text-Book of General Lichenology*, containing descriptions and figures of the genera occurring in the North-eastern United States.

The Rev. W. H. Painter, of Stirchley Rectory, Shifnal, Salop, proposes to issue shortly, if a sufficient number of copies are subscribed for, a Supplement to his *Contribution to the Flora of Derbyshire*, which will contain additional habitats and records of the Mosses known in the northern and southern divisions of the county. The Supplement will contain sixty-four pages, and will be issued at 2s. 6d. per copy and postage.

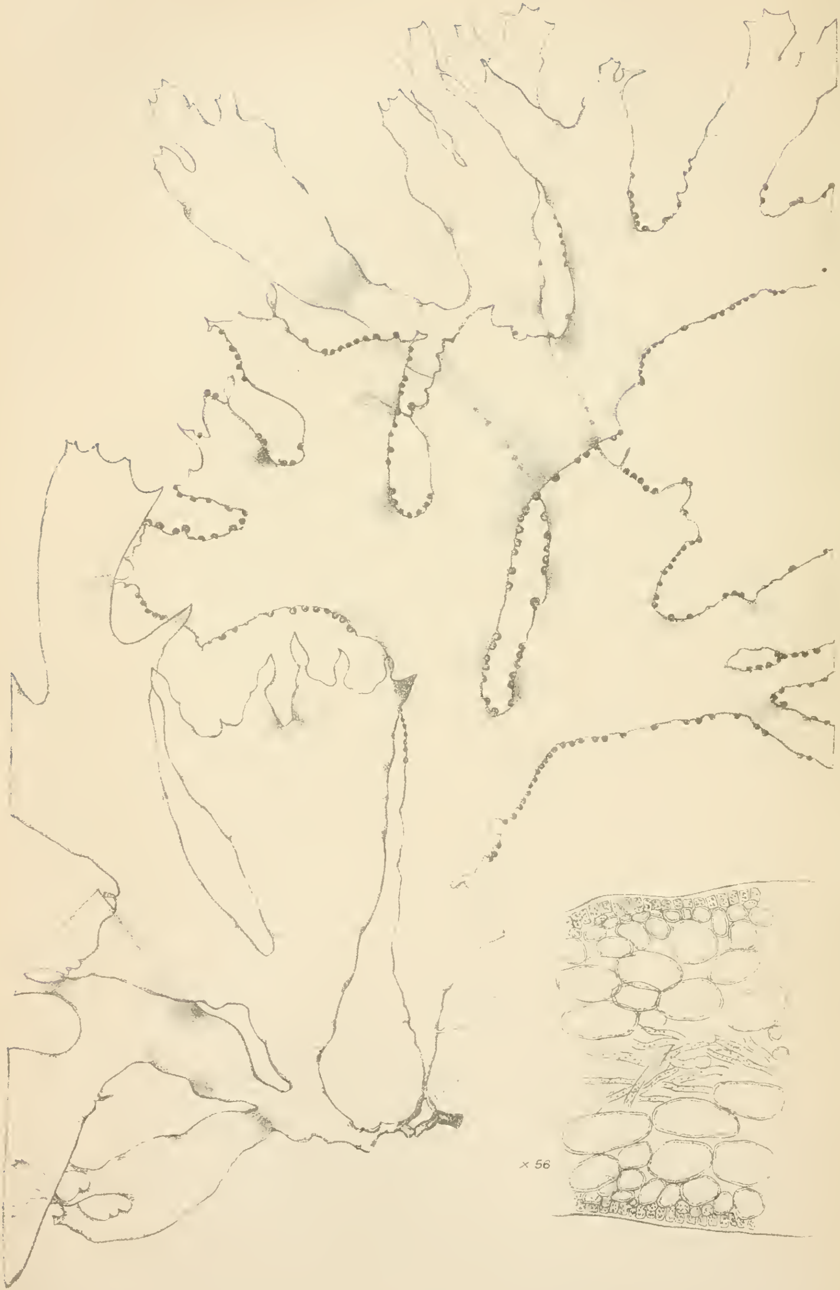
Mr. Burkill informs us that *Luffa ægyptiaca* is correctly included in his list of British Central African plants (see p. 320), although *Momordica foetida* was also distributed under the same Buchanan number.

A new "journal of American science" is announced for publication, named, after its proprietor, *Orcutt*. The prospectus says:—

"No complimentary copies; no free samples; no exchanges; no advertisements in the text; no premiums; no discount to agents—the whole income going to make it better and larger! Botany and horticultural science will receive the greatest attention in the first numbers; botanists are invited to publish new species in its pages."

In *Through Unknown African Countries* (London: Edward Arnold; 21s. net) Dr. Donaldson Smith gives an account of his expedition—the first undertaken—from Somaliland to Lake Rudolf. It is a handsome volume, well printed and illustrated, but its weight (4 lb. 5½ oz.), owing to the paper employed, renders it a serious addition to a traveller's *impedimenta*. The natural history of the expedition is dealt with in a series of appendixes; but the list of Dr. Smith's plants which was drawn up for him at the British Museum, where the specimens are deposited, is not included. This is to be regretted, as the collection contained many interesting species, the most remarkable of which were described in this Journal for 1896; one plate illustrating the new genera, *Donaldsonia* and *Gillettia* (*Anthericopsis*), is reproduced in the volume.

Mr. E. A. Martin, whose *Nature-Chat* we notice on another page, must look to his laurels: as an interpreter of Nature's problems he is being run very close by a Mr. Harry Lowerison, who is contributing to *London* a series of papers entitled "The Naturalist in London." Here is an extract; those who wish to observe the remarkable "geranium in the border" will find it in Finsbury Park. "Here is a plant with the general habit and appearance of privet, only the leaves are broader and toothed, and the stamens are so long and feathery that one is not surprised to read the label and find that the shrub is really a variety of spirea. Many such 'gardeners varieties' we have in the parks. Students of the problems that underlie variation will find ample materials here ready to their hand. As a case in point, we can stop before this geranium in the border. Is it a simple crane's-bill that has originally, itself or forbears, grown in the fields, inadvertently been transplanted here, found itself in a richer soil, and, with better opportunities, made a big stride forward in size and fragrance? Or, on the other hand, was it a pot plant neglected and starved, and consequently shrivelled, till some pitying gardener gave it a chance of better things in the open parterre? One does not know, but here in a humble plant may be one of the 'missing links' that the non-scientific world taunted the great Darwin with not being able to produce. Here, continuing the same line of thought, is the *Cratægus grandiflora*, in English the large flowered hawthorn, a variety that has been for long cultivated for its big white or creamy corolla. Another variety of the same species I call the beech-leaved hawthorn, as under cultivation and careful manipulation it has lost the lobes that distinguish the acanthus leaf, and the leaf margins now show an unbroken line like those of the beech."



R Morgan lith

West Newman imp

Flahaultia palmata *Bart.*

WELWITSCH'S AFRICAN MARINE ALGÆ.

By Ethel S. Barton.

(Plate 373.)

[Most classes of the Angolan Algæ are in general less abundant than in the extra-tropical zones, and they diminish in number of species from the littoral regions towards the mountainous country in the interior, until further inland the highlands are reached, where, with the necessary exception of the marine genera, the greatest number of species were found.

Among the *Desmidiaceæ*, *Penium Digitus* Bréb. and *Closterium Lunula* Ehrenb. are particularly abundant in stagnant pools in the coast region. *Cladophora* is a prevalent genus both in fresh water and in the sea; the species of *Oscillatoria* appear to be scarce in the rainy districts. In the highland region various species of *Scytonema* are produced in enormous quantities and of many colours; it is a species of this genus which when prodigiously multiplied causes the black colour of the rocks of Pungo Andongo, commonly called Pedras Negras. Towards the interior of Angola species of *Scytonema* are found which cover extensive tracts with a red or rusty colour, and some of them are very frequent in the highlands of Pungo Andongo and on the plateau of Huilla, and there innumerable plants of *Utricularia*, *Eriocaulon*, *Isoetes*, *Centunculus*, *Ammannia*, *Striga*, *Burmannia*, small *Scirpideæ*, *Campanulaceæ*, parasitical *Gentianeæ*, and even some *Leguminosæ*, *Selagineæ*, and *Melastomaceæ* are enabled to exist solely through the instrumentality of the *Scytonemata* which by night greedily absorb every dew-drop, and thus preserve the roots of the little plants which they cover from drying up by day under the influence of the burning tropical sun.

Some large species of *Batrachospermum*, all previously undescribed, inhabit the streams of Pungo Andongo and Huilla, growing in the former district in company with two species of *Podostemon*.

The red sea-weeds are more numerous than the brown, and they are distributed among many genera; a diminutive species of *Bostrychia* resides on the bark of *Rhizophora Mangle* L., and with its yellow-green colour clothes the trunks just like a moss, being bathed with sea-water at high tide. *Hildenbrandtia* is represented by two species, one of which is new and abounds in the streams of Golungo Alto, ornamenting the submerged rocks and stones with a network of a blood-red colour. (See Welwitsch, Apont. 533.)

A census of the collection of Algæ, as determined by Miss Barton and the Messrs. West, respectively, shows 39 marine species in 32 genera, and 300 freshwater species in 77 genera; among the latter 80 species occurred in the littoral districts of Angola or in the African islands visited by Welwitsch, and 255 in the mountainous districts or highland districts of Angola; only one new species of marine algæ is described, but a large proportion of the freshwater algæ are new and contain 106 new species and 8 new genera, two of the latter constituting new orders, namely, *Temno-*

Zygnemaceæ in *Conjugatæ*, and *Camptotricheæ* in *Hormogoneæ Homocysteæ*.—W. P. HIERN.]

CYANOPHYCEÆ.

1. HYELLA Born. & Flah. in Morot, Journ. de Bot. 1888, ii. 162.

1. H. CÆSPITOSA Born. & Flah. Loanda: near the shore; March, 1854. No. 36A.

Geogr. Distr. North Atlantic, Mediterranean, Cape of Good Hope.

CHLOROPHYCEÆ.

1. ULVA L. Gen. 326.

1. U. LACTUCA L. Loanda: on the shore; Feb. 1854. Near S. Pedro; July, 1854. No. 33.

Geogr. Distr. N. Atlantic, North Sea, Mediterranean, West Indies, South Pacific (*fide* De Toni), Australia.

2. U. FASCIATA Del. Loanda: on rocks of the sea near S. Pedro, Morro de Lagostas, frequent; Feb. and July, 1854. No. 34.

Geogr. Distr. General in warm seas.

2. ENTOCLADIA Reinke in Bot. Zeit. 1879, 476.

1. E. VIRIDIS Reinke. Loanda: in *Nitophyllum;* July, 1854. No. 100.

Geogr. Distr. North Sea, Mediterranean, Adriatic.

3. DASYCLADUS Ag. in Reg. Flora, 1827, ii. 640.

1. D. CLAVÆFORMIS Ag. Madeira: Funchal. No. 266.

Geogr. Distr. North Atlantic, Mediterranean, West Indies.

4. CAULERPA Lam. in Desv. Journ. Bot. ii. 141.

1. C. SELAGO Ag. St. Vincent, Cape de Verde: on rocks covered by volcanic sand; Aug. 1853. No. 214.

Geogr. Distr. Red Sea, West Indies.

2. C. SCALPELLIFORMIS Ag. Loanda: S. Pedro; Feb. 1854. No. 46. Island of St. Thomas: on the shore of the island (below the equator), together with *Codium tomentosum;* Dec. 1860. No. 262.

Geogr. Distr. Indian Ocean, Australia.

3. C. CLAVIFERA Ag. St. Vincent, Cape de Verde: very rare on rocks covered with volcanic sand, Porto de Mindello; 22 Aug., 1853. No. 215.

Geogr. Distr. In tropical seas, and Cape of Good Hope.

5. CODIUM Stackh. Ner. Br. p. xvi.

1. C. ELONGATUM Ag. Loanda: thrown up on the shores of the island, near S. Pedro; Oct. 1853; Feb. and May, 1854. No. 48.

Geogr. Distr. North and South Atlantic, North Pacific, Mediterranean, Indian Ocean, Cape of Good Hope, Australia.

2. C. TOMENTOSUM Stackh. Loanda, frequent; Feb. 1854. No. 47.

Geogr. Distr. General.

6. HALIMEDA Lam. in Nouv. Bull. Soc. Philom. Nov. 1812, 186.

1. H. TUNA Lam. St. Vincent, Cape de Verde: rare on basaltic shore; Aug. 1853. No. 247.
Geogr. Distr. North Atlantic, Mediterranean, West Indies.

PHÆOPHYCEÆ.

1. CYSTOSEIRA Ag. Sp. i. 50.

1. C. ABIES-MARINA Ag. St. Vincent, Cape de Verde: rather frequent and well-developed on volcanic rocks near Praia de Galè; 20 Aug. 1853. No. 221.
Geogr. Distr. North Atlantic, Mediterranean.

2. PADINA Adans. Fam. des Plantes, pt. ii. 13.

1. P. PAVONIA Lam. Loanda: on rocks close to the shore of the ocean near S. Pedro, frequent; Feb. and July, 1854. No. 40. St. Vincent, Cape de Verde: thrown up near Praia de Galè; Sept. 1853. No. 210.
Geogr. Distr. General in temperate and warm oceans.

3. DICTYOTA Lam. in Desv. Journ. Bot. ii. 38.

1. D. DICHOTOMA Lam. Prince's Island: on rocks of the ocean, not infrequent, close to the shore. Bahia de St. Antonio; 20 Sept. 1853. No. 258.
Geogr. Distr. Warm and temperate oceans.

4. HYDROCLATHRUS Bory in Dict. Class. viii. 1825, 419.

1. H. CANCELLATUS Bory. Loanda: thrown up by the Atlantic at Praia de Gamba, frequent; 4 Dec. 1853; 3 Feb. 1854. No. 45.
Geogr. Distr. Warm Atlantic, North and South Pacific, Indian Ocean, Australia.

5. COLPOMENIA Derb. & Sol. Mém. Phys. Alg. 11.

1. C. SINUOSA Derb. & Sol. Loanda: thrown up by the ocean near S. Pedro, very rare. No. 44. Madeira: Funchal, 1852. No. 265.
Geogr. Distr. Warm Atlantic, North and South Pacific, Indian Ocean, Mediterranean and Adriatic, Australia.

FLORIDEÆ.

1. GALAXAURA Lam. Polyp. Flex. 259.

1. G. FRAGILIS Dcne. Very frequent on the shores of St. Vincent, Cape de Verde, thrown up by the sea in great abundance. Island of St. Vincent, Cape de Verde: on volcanic rocks near Praia de Galè, especially frequent; 21 Aug. 1853. No. 220.
Geogr. Distr. In warm and tropical seas.

2. G. OBTUSATA J. Ag. Loanda, 1854. No. 275.
Geogr. Distr. Warm Atlantic, Cape of Good Hope.

2. CAULACANTHUS Kütz. Phyc. Gen. 395.

1. C. USTULATUS Kütz. Mossamedes: very frequent on calcareous rocks of the sea near Mossamedes; July, 1859. No. 76. Frequent

on calcareous and sandstone submarine rocks near Mossamedes; July, 1859. No. 77. St. Vincent, Cape de Verde: on the shore, Praia de Galè; Aug. 1853. No. 230.

Geogr. Distr. Atlantic, Mediterranean, Cape of Good Hope, China Sea.

3. GELIDIUM Lam. in Ann. Mus. Hist. Nat. Paris, xx. 1813, 128.

1. G. CORNEUM Lam. Benguella: on Patellæ thrown up by the Atlantic near Benguella; June, 1859. No. 75. Loanda: on rocks near S. Pedro, frequently covering all the rocks; July, 1854. No. 50.

Geogr. Distr. Throughout all oceans.

4. GIGARTINA Lam. Ann. Mus. Hist. Nat. Paris, xx. 1813, 134.

1. G. TEEDII J. Ag. Loanda: Morro das Lagaotas, rare; July, 1854. No. 117.

Geogr. Distr. Warm Atlantic, Mediterranean, Cape of Good Hope.

5. FLAHAULTIA Born. Alg. Schousb. 278.

1. **F. palmata**, sp. n. Fronde gelatinoso-membranacea, evidenter stipitata, a disco radicali in laminam usque 25 cm. altam, subpalmatam, aut in lacinias irregulariter fissam, cuneatim expansa; margine sæpe prolifero; segmentis fertilibus minute fimbriatis; cystocarpiis marginalibus, carpostomio apertis. Soris tetrasporarum indefinitis per totam superficiem sparsis. (Plate 373.)

A *F. appendiculata* Born., habitu nonnunquam subsimili, imprimis differt cystocarpiis marginalibus et sporangiis per totam frondem sparsis.

Loanda: frequent near Morro das Lagostas; Jan. 1854. No. 65. Angola, Fort Conceiçao; July, 1854. Nos. 78, 80. On shells and rocks near Morro das Lagostas, frequent; Jan. 1854. No. 99.

6. GRACILARIA Grev. Alg. Brit. 121.

1. G. CONFERVOIDES Grev. Loanda: thrown up on the island, rare; Jan. 1854. No. 95.

Geogr. Distr. Throughout all seas.

7. HYPNEA Lam. in Ann. Mus. Hist. Nat. Paris, xx. 131, 1813.

1. H. MUSCIFORMIS Lam. Loanda: when living, mostly pale brown and fragile; when thrown up and exposed to the air it becomes flaccid and of a red, purple, and orange colour, variegated. Fruit occurs rarely. Frequent and of various forms on rocks, shells and other algæ on the shores of Loanda, where large quantities are thrown up. On coralline rocks near S. Pedro; July, 1854. No. 84. St. Vincent, Cape de Verde: on volcanic rocks and on other algæ on the shore, frequent. Praia de Galè, Aug. 1853. No. 250.

Geogr. Distr. Warm Atlantic, Indian and Southern Oceans.

8. RHODYMENIA J. Ag. Alg. Liebm. 15.

1. R. PALMETTA J. Ag. Loanda: on rocks at Morro das Lagostas; Jan. 1854. No. 115.

Geogr. Distr. North Atlantic.

9. CHRYSYMENIA J. Ag. Alg. Med. et Adriat. 105.

1. C. UVARIA J. Ag. St. Vincent, Cape de Verde: on the shores. When alive, rose-purple, wine-colour; Aug. 1853. No. 240.

Geogr. Distr. Warm Atlantic (Europe and America), Cape of Good Hope.

10. PLOCAMIUM Lam. Ann. Mus. Hist. Nat. Paris, xx. 137, 1813.

1. P. COCCINEUM Lyngbye. St. Vincent, Cape de Verde: on volcanic rocks near Praia de Galè; 21 Aug. 1853. No. 241.

Geogr. Distr. North Atlantic, North Pacific, West Indies, Cape of Good Hope, Australia, Tasmania.

11. ACANTHOPHORA Lam. in Ann. Mus. Hist. Nat. Paris, xx. 132, 1813.

1. A. THIERII Lam. Loanda: on shells near the shore of the island Loanda and Ilha dos Passeros; Jan. and April, 1854. No. 112. Loanda, Oct. 1853. No. 113. On oyster-shells near Cabo Lombo; 28 Nov. 1853. No. 114.

Geogr. Distr. Warm Atlantic (western shores), Europe (Biarritz), Australia.

12. POLYSIPHONIA Grev. Flora Edin. 308.

1. P. ELONGATA Harv. Loanda: on rocks on the Atlantic shores of Loanda near Fort S. Pedro and Conceiçao, frequently thrown up; Dec. 1853 and Jan. 1854. No. 52.

Geogr. Distr. North Atlantic, West Indies, Mediterranean, Adriatic and Black Sea.

2. P. PENNATA J. Ag. Loanda: on rocks of the Loanda shore near Fort S. Pedro; Feb. 1854. Penedo, July, 1854. No. 96.

Geogr. Distr. Atlantic shores of Europe, Mediterranean, Australia.

13. BOSTRYCHIA Mont. in Sagra Hist. Cuba, Paris, 1838–42, 39.

1. B. TENELLA J. Ag. Loanda: on trunks of *Rhizophora Mangle* immersed at high water, near Cabo Lombo, on the shores of Loanda, occurring rarely, but always broadly cæspitose, covering the trunks exactly like a *Hypnum*; 29 Nov. 1853. Nos. 59, 60.

Geogr. Distr. West Indies, Cape of Good Hope, Indian Ocean, Friendly Islands.

14. SPYRIDIA Harv. in Hook. Br. Fl. ii. pt. i. 1833, 336.

1. S. ACULEATA Kütz. St. Vincent, Cape de Verde; 22 Aug. 1853. No. 217.

2. S. CLAVATA Kütz. Loanda: on the shore, thrown up by the ocean; this one specimen near Fort de Conceiçao; Jan. 1854. No. 58.

Geogr. Distr. North Atlantic (Spain), West Indies, Mediterranean, Red Sea.

15. CERAMIUM Roth, Cat. Bot. iii. 106.

1. C. DIAPHANUM Roth. Loanda: Morro das Lagostas, on a species of *Hypnea*, &c.; Jan. 1854. No. 67, and on 65.

Geogr. Distr. Atlantic (Europe), West Indies, Cape of Good Hope.

16. CENTROCERAS Kütz. in Linnæa, 1841, 741.

1. C. CLAVULATUM Mont. Loanda: on rocks covered by sand on the shore near Fort de Conceiçao; Dec. 1853. No. 61. Near S. Pedro; Feb. and April, 1854. No. 64. On rocks of the sea near Morro das Lagostas and S. Pedro, frequent; Jan. 1854. No. 66.

Geogr. Distr. Throughout all tropical and subtropical seas.

17. PEYSSONELIA Dene. Pl. Arab. 168.

1. P. RUBRA J. Ag. Loanda: on rocks and various algæ, Praia de Penedo; Jan. and Feb. 1854. No. 121. Island of Loanda, May, 1854. No. 123. St. Vincent, Cape de Verde: on rocks and various algæ near volcanic rocks, but rarely well developed; 22 Aug. 1853. No. 233. Prince's Island: on rocks in the Atlantic, here and there, growing gregariously; 21 Sept. 1853. No. 256.

Geogr. Distr. Adriatic, West Indies.

2. P. HARVEYANA Crn. Loanda: Morro das Lagostas, July, 1854. No. 122. St. Vincent, Cape de Verde: Praia de Galè, 22 Aug. 1853. No. 236.

Geogr. Distr. Atlantic shores of Europe.

18. GRATELOUPIA Ag. Spec. Alg. i. 221.

1. G. LANCEOLA J. Ag. Loanda: fronds gregarious, chiefly covering the sides of rocks and stones; fertile plants always much branched, when sterile smaller. Colour when alive a dark steely purple. Hab. on the Angola shores near Morro das Lagostas, rare, on rocks; July, 1854. No. 120.

Geogr. Distr. North Atlantic (Africa).

19. MELOBESIA Lam. Hist. Polyp. Flex. 313.

1. M. CORTICIFORMIS Kütz. St. Vincent, Cape de Verde: on the fronds of *Gelidium rigidum*, on the shore; Aug. 1853. No. 251.

Geogr. Distr. Atlantic, Mediterranean, Cape of Good Hope.

20. CORALLINA L. Syst. Nat. ed. 12, i. pt. ii. 1304.

1. C. OFFICINALIS L. Madeira: Praia de Camara dos lobos; Aug. 1853. With No. 268.

Geogr. Distr. Arctic Sea, North and South Atlantic, Mediterranean, Black Sea, Cape of Good Hope, West Indies, North and South Pacific, Australia.

A certain number of the algæ collected by Dr. Welwitsch are not sufficiently well preserved to be named specifically, and are therefore not given here. Among these are species of *Cyanophyceæ*, *Cladophora*, *Sargassum*, *Dictyota*, *Corallineæ*, *Gracilaria*, *Polysiphonia*, and *Nitophyllum*.

The material of *Flahaultia palmata*, being dry, was not good enough to enable an accurate figure of the entire cystocarp to be made. It agrees in all respects with the figure by Dr. Bornet in his paper on Schousboe's Algæ (Alg. Schousb. Mém. Soc. Sci. Nat. Cherb. t. xxviii. 1892, pl. ii. fig. 5). My thanks are due to Mr. Batters for his kind help in determining several species.

NEW AND INTERESTING ACANTHACEÆ
COLLECTED BY MRS. LORT PHILLIPS IN SOMALI-LAND, 1896–7.

By A. B. RENDLE, M.A., F.L.S.

Blepharis Phillipseæ, sp. n. Fruticulosa caule canescente, foliis minutis crassiusculis 4-verticillatis ellipticis vel oblongo-ellipticis mucronatis integris albide-scabridulis; floribus solitariis sessilibus ramulos contractos terminantibus, cum bracteis decussantibus ellipticis apice 3-spinulosis, calyce brevioribus, præeuntibus; sepalo postico cuneato-oblanceolato 3-nervio apice acute et breviter trifido, antico minore 2-nervio lineari-oblongo, apice minute 2-spinuloso, lateralibus brevioribus anguste lanceolatis, mucronatis; corolla flava, tubo urceolato, limbo curvulo magno rhomboideo-ovali apice 3-lobulato omnino puberulo; staminibus subæqualibus; ovulis 2.

Hab. Bihen, Mrs. E. Lort Phillips.

Described from a small irregularly branching shoot, 22 cm. long; 2 mm. in diameter in the older portion. The slender terete young twigs are covered with short flexuose whitish hairs, gradually disappearing in the older parts of the shoot, which show a thin white-striated bark. Leaves pale green, ·5 cm. long, and half as broad; apex round, with a short pungent mucro; surface covered with numerous hard white round wartlets; midrib hairy on the back. Flowers preceded by four pairs of gradually increasing decussating rigid bracts, more or less elliptical. with the prominent midrib and two less prominent parallel lateral veins produced into sharp rigid spines; uppermost pair oblong-elliptical, slightly narrowing at the base, with lateral spines minute; lowest pair 3 mm. long, uppermost 11 mm.; exposed portions suffused and streaked with brown. Anterior sepal prominently 2-nerved, streaked with brown in upper half, 13 mm. long by 3 mm. broad; posterior 14 by 5 mm., more deeply coloured, lateral sepals weaker, one-nerved, with transparent margin, 11 by 2 mm. Corolla-tube stout, rigid, 6 mm. long, 3·5 mm. in diameter below the constriction, with a short triangular posterior notch; a ring of stiff white hairs attached on the inside at the constriction roofs in the lower part of the tube. Limb 1·5 cm. long by 1 cm. broad; midrib much thickened and glabrous in the lower third. Stamens inserted at the mouth of the tube; anterior broadly laterally flattened, 6 by 1·5 mm., anther 3 mm. long, with a broad hairy fringed margin; posterior with an upwardly arching base, terete, anthers (3 mm. long) with a brush of white hairs on the posterior face, and a hairy fringe on their adjacent margins. Ovary ovoid-oblong (2·25 mm. long), girt at the base with a shallow fleshy disc with a wavy margin, and crowned by a yellowish unilateral gland at the base of the style; style 8 mm. long, flattened, and bearing a central raised longitudinal furrow in the lower part.

Recalls the Socotran *B. spiculifolia* Balf. fil. in habit and small foliage; that, however, has larger oblanceolate leaves, entire outer sepals, and a smaller corolla with a 5-lobulate limb.

BARLERIA (§ EUBARLERIA) HILDEBRANDTII S. Moore in Journ. Bot. 1877, 69. Wagga Mountain, facing south, 5000 ft., Mrs. E. Lort Phillips.

A very fine specimen, 66 cm. high, with a stem reaching 1 cm. in diameter at the base, and leaves larger than in the type (to 2·5 cm. long by 1·6 cm. broad), with the same stellate tomentum, and scattered long yellow strigose hairs. In the following I am able to supplement the original description:—Flowers mauve. Fruit glabrous, one-third shorter than the large outer calyx-segments, and slightly exceeding the inner narrow sepals, 1 cm. long and half as broad; compressed ellipsoid narrowing abruptly at the apex to a short stout beak. Seeds one in each chamber, orbicular with a subcordate base, barely ·5 cm. long and broad, with a dense appressed woolly covering.

The type-plant was collected by Hildebrandt on the "Ahlgebirge," Somali-land, at a height of 1500 to 2000 metres.

Barleria (§ EUBARLERIA) **rotundisepala**, sp. n. Fruticulosa caule ramisque cinereo-pubescentibus et minute glanduligeris; foliis breviter petiolatis ellipticis, interdum oblongo- vel ovato-ellipticis, dense appresso-pilosis; floribus inter mediocres in ramulis brevibus dichasialibus vel abortu solitariis, pedicellis brevibus, bracteis foliaceis vel minoribus; sepalis 2 exterioribus magnis orbicularibus, dorso appresso-pilosis, margine minute glanduligeris, 2 interioribus triplo minoribus crassiusculis lanceolatis acutis; corolla inconspicue bilabiata, lobo antico obovato integro, lobis 4 posticis altius connatis obovatis interioribus angustioribus, retusis, tubo subcylindrico superne subampliato; staminodiis 3 minutis, postico altius affixo; ovario ovato pubescente.

Hab. Wagga Mountain, Mrs. E. Lort Phillips.

A small shrub, 25 cm. high, with short irregularly patent and ascending branches, and a stout reddish brown main root with slender reddish branches. Leaves generally between 2 and 3 cm. long by 1 to 1·75 cm. broad, excluding the petiole of 3–5 mm. long; apex rounded, base rounded or very blunt. Bracteoles small sub-oblanceolate about ·5 cm. long, hairy like the leaves. Flower-pedicel 5 mm. long. Posterior sepal generally 11 mm. long and broad, sometimes slightly ovate, and scarcely as broad as long; anterior sepal slightly smaller; lateral sepals completely hidden by the outer, scarcely 4 mm. long. Corolla-tube 1 cm. long, slightly constricted at the insertion of the stamens, 2·5 mm. above the base, about 2 mm. in diameter at the constriction, widening very gradually to nearly 4 mm. at the mouth. Anterior lobe 9 mm. long by 7 mm. broad; outer (lower) posterior lobes 7 mm. by 6 mm., inner 7 mm. by 4·5 mm. Filaments of stamens 1·5 cm. long, anthers 2 mm., staminodes less than 1 mm. Filiform style 1.5 cm., sparsely hairy at the base. Ovary 3 mm. long, covered with a short pubescence.

Near the Abyssinian *B. orbicularis* T. And., which, however, is less hairy, has narrower papery leaves, cordate outer sepals, and shorter corolla lobes.

Barleria (§ Prionitis) **waggana**, sp. n. Fruticulosa caule cinereo-pubescente, foliis sessilibus, cuneato-oblongis, interdum cuneatis, apice rotundatis mucronatis, dorso dense appresso-villosis; spinis breviter stipitatis, sæpissime 4-fidis; floribus apice ramorum dense aggregatis; bracteis bracteolisque dorso et margine hirsutulis oblongo-linearibus longe acuminatis superioribus subulatis, omnibus apice pungentibus; floribus inter mediocres sessilibus, sepalis exterioribus ovatis, interioribus lanceolatis longissime acuminatis apice pungentibus, margine scabride-ciliatis; corollæ tubo longo cylindrico, lobis subæqualibus, lobo antico spathulato, lobis 4 posticis oblanceolato-cuneatis obtusis; staminodiis 2 brevibus glabris; ovario glabro.

Hab. Wagga Mountain, Mrs. E. Lort Phillips.

Described from a single specimen consisting of a small branch about six inches long. Leaves on short lateral flowering branchlets, and below the inflorescence 1·75 to 2·5 cm. long by 6 to 9 mm. broad, covered, especially on the back, with short stiff white appressed hairs. Axillary spines white, branching dichotomously above a pedicel of 2–4 mm. into four (rarely three) arms, which reach 2 cm. in length. Flowers crowded into small shortly hairy pungent heads, made up of very short dichasia, the two lateral flowers of which abort. Lowermost bracts foliaceous, upper becoming narrow and more pungent, passing into the subulate bracteoles; length (including bracteoles) from 1½–1 cm. Outer calyx-segments 14 mm. long by 2·5 mm. broad, inner 13 mm. long by 1·5 mm. Corolla-tube 12 mm. long by 2 mm. in diameter; lobes about 1 cm. long by ·5 cm. wide. Filaments of long perfect stamens 1·5 cm. long, anther 2 mm., staminodes 2 mm., including the minute anther. Hypogynous disc asymmetrical, with an irregularly crenate margin. Style 2 cm. Ovary 3 mm. long.

Probably near *B. quadrispina* Lindau, which I have not seen, and of which flowers and fruit are unknown! The leaves are, however, larger, with a tendency to a lanceolate shape.

Barleria (Prionitis) mucronifolia Lindau in Ann. R. Istit. Botan. Roma, vi. 71. A small branch bearing two lateral inflorescences, from the flowers of which the corolla has dropped, though the fruit is still unripe, apparently belongs (from the description) to this species, collected by Riva near Hamari, in Somaliland. It was found at Dimoleh by F. Gillett and G. P. V. Aylmer. Unripe fruit 9 mm. long, including short beak; black, glabrous, with two superposed compressed black seeds in each chamber.

A fragment of the same plant occurs on a sheet of Forskohl ("ex oriente") along with *B. acanthoides* Vahl.

Barleria (§ Somalia) **Phillipseæ**, sp. n. Fruticulosa foliis subsessilibus elliptico-oblongis apice rotundatis, in margine et costa media cum pilis bibrachiatis albis strigosis; floribus parvis paucis solitariis axillaribus subsessilibus; bracteolis lanceolatis; calycis laciniis antero-posterioribus ovato-lanceolatis, acutis, lateralibus duplo brevioribus subulatis; corolla inconspicue bilabiata, lobo antico majore suborbiculari vix retuso, lobo postico breviter et æqualiter 4-lobulato, externe puberulo; staminodiis 3 minutis; capsula glabra.

Hab. Wagga Mountain, Mrs. E. Lort Phillips.

Apparently a small low-growing plant, specimens not exceeding 5 in. Branches slender, densely covered with appressed 2-armed hairs, among which are short capitate glandular hairs. Leaves 2 to 2·5 cm. long, including a very short petiole (1–3 mm.) by 6–7 mm. broad; sage-green. Pedicel 1·5 mm. long, bracteoles immediately beneath the calyx, 10 mm. long by scarcely 3 mm. broad, margin and midrib hairy as in the leaves. Outer calyx-segments with a line of similar stiff white hairs outside on the midrib, and a few short glandular hairs, 11 mm. long by 3 mm. broad; inner segments with a line of hairs running from two-thirds the length up, 5·3 mm. long by less than 1 mm. broad. Corolla 11 mm. long, tube 5 mm. long, anterior lobe 5·5 mm. each way, lobes of the posterior lip rounded, 3 by 2·7 mm. Filaments of fertile (two) stamens 6·5 mm. long, anthers scarcely 2 mm.; staminodes minute, subulate, about 5 mm. long. Ovary girt at the base with a short asymmetrical disc, loculi 1-ovuled, with a minute rudiment of a lower second ovule. Capsule unripe.

Apparently near *B. pauciflora* Schw., whatever that insufficiently known species may be.

Justicia (§ Tyloglossa) **Phillipseæ**, sp. n. Fruticosa diffusa hispidula, foliis parvis breviter petiolatis ovatis vel lanceolatis obtusis; floribus sessilibus in cymis dichasiis axillaribus 1–paucifloris contractis; bracteis parvis foliaceis, bracteolis minutis ovatis; calyce fere ad basin æqualiter 5-partito, segmentis angustis superne attenuatis acutis 3-nerviis; corolla læte purpurea sparse puberula tubo ventricoso, labio postico truncate-ovato apice breviter bilobo, antico 3-lobo, lobo medio e basi truncata oblongo, lobis lateralibus paullo angustioribus; antheræ loculo inferiore appendiculato.

Hab. Wagga Mountain; Upper Sheik; and between Dobar and Hammer, Mrs. E. Lort Phillips.

A shrub with long slender terete spreading branches. Leaves like the stem, more or less shortly hispidulous; petioles 2–3 mm. long, blades from 6 to 20 mm. long. Flowers apparently solitary, but arranged in contracted axillary dichasial cymes, on which generally only one develops. Bracts ovate, 5 mm. long; bracteoles 1 mm. long, immediately below the calyx. Calyx-segments 7 mm., tapering upwards from a base of a little over 1 mm. Corolla-tube 5 mm. long, with a diameter of 2 mm.; posterior lip suberect, 6 mm. long, narrowing upwards from the base, where it is 4 mm. broad, to 2 mm. at the shortly bilobed apex. Anterior lip 1 cm. long, centre lobe 4 by 4 mm., lateral lobes 4 by 3·5 mm. Stamens 5 mm. long, upper anther-cell 1 mm. long, lower slightly larger, with a basal appendage about half its length. Ovary oblong-ovate, scarcely 2 mm. long, girt with an annular disc ·5 mm. high. Style 7 mm. long, sparsely hairy at the base; the transparent walls allow the enclosed pair of superposed ovules to be seen in each cell.

Near *J. calcarata* Hochst., from which it differs in habit; in its smaller more or less ovate leaves, narrower and longer calyx-segments, and shorter ventricose corolla-tube.

Justicia (§ Tyloglossa) **Lorteæ,** sp. n. Fruticosa diffusa ramis glabris albescentibus; foliis sessilibus anguste lineari-oblanceolatis sæpe plus minus convolutis glabris, apice submucronulato; cymis sæpius 2–3-floris, axillaribus, sessilibus; floribus inter minores, bracteis foliaceis, bracteolis ultimis minutis acutis; calyce fere ad basin 5-partito, segmentis subæqualibus, angustis e basi attenuatis, acutis glabris, cum margine scabridula; corolla flava utrinque puberula, tubo ventricoso ore dilatato, labio postico apice bilobo et crispulato; antico 3-lobo, lobo medio latiore, disco bullato venulis conspicuis radiatim lineato; antheræ appendice compresso emarginato; capsula acuta 4-sperma, seminibus verrucosis.

Hab. Wagga Mountain and Bihen, Mrs. E. Lort Phillips.

Apparently a small shrub, with slender subterete irregularly spreading branches. Leaves 1 to 3·5 cm. long by 1 to 3·5 mm. broad. Small axillary congested inflorescences numerous, from the base to apex of the branches. Calyx-segments 4 mm. long, corolla bright yellow, tube 6 mm. long by 3 mm. in diameter below dilating to 4 mm. at the mouth, and bearing a pair of long wing-like invaginations diverging upwards to the base of the lower lip, and a pair of hairy keels parallel with and posterior to the base of filaments; upper lip 7 to 8 mm. long, narrowing upwards from a base of 6 mm. to 2 mm. just below the slightly dilated apex; lower lip 8·5 to 10 mm., lobes bluntly rounded, median 4 to 5 mm. long and almost as broad, laterals 3·5 to 4 mm. long by 2·5 to 3·5 mm. broad. Stamens 6 mm. long, lower anther 1·3 mm. long, bearing an emarginate appendage about half its length; upper anther slightly smaller. Style nearly 8 mm. long, sparsely hairy below. Fruit unripe, 1·5 cm. long, more or less elliptically oblong, narrowing at the base, apex shortly mucronate.

Near *J. filifolia* Lindau, which, however, has smaller flowers, whitish in colour, with a rosy disc.

Ecbolium parvibracteatum, sp. n. Frutex pubescens foliis magnis petiolatis ovatis interdum ovalibus; floribus in cymis dichasialibus sessilibus oppositis in spicis terminalibus aggregatis; bracteis quam floribus multoties brevioribus ovatis acutis; calyce regulariter 5-partito, segmentis lanceolatis acutis; corollæ tubo longo tenuiter cylindrico, labio postico manco e basi lata ad apicem subtruncatum cucullatum bilobulatum angustato, labio antico insigniore, lobis 3 ellipticis, medio quam laterales paullo latiore.

Hab. In ravine, Wagga Mountain, Mrs. E. Lort Phillips and Miss F. Gillett.

A bushy shrub, the stoutish branches, leaves, and inflorescence covered with a short white pubescence. Petioles about 1 cm. long. Leaves generally ovate, the smaller sometimes oval, subobtuse or sometimes subacuminate, entire, bright green, 6–11 cm. long by 3 to 7 cm. broad. Spikes dense, 4 to 7 cm. long. Bracts small, caducous, 3–4 mm. long. Bracteoles similar, but scarcely 2 mm. long. Calyx divided almost to the base, segments scarcely 5 mm. long. Corolla-tube 22 mm. long by 1·5 mm. in diameter; posterior lip insignificant, 8 mm. long, narrowing upwards from nearly 5 mm. at the base to 1·5 mm. below the apex; anterior lip spreading, 1 cm. long, lobes 7 mm. long, the median 4·5 mm. broad, the lateral scarcely 4 mm. Stamens ·5 cm. long, including the anther-cells (3 mm.), which are parallel, but not quite on the same level. Style filiform, red, sparsely hairy at base, 22 mm. long. Ovary pubescent, ovately oblong, 4 mm. long, girt by a short annular disc at base. Fruit brown, 2 cm. long, lower third forming a narrow stalk; upper discoid, containing the brown flattened suborbicular seeds (8 mm. long by 7 mm. broad), with indented hilum and rugose surface.

A striking plant, with the habit of *E. Linneanum* Kurz, from which, however, it is at once distinguished by its minute bracts.

The collection also contains specimens of *Asystasia Coleæ* Rolfe, from Wagga Mountains and Upper Sheik, which was described from plants collected in Somali-land by Mrs. Phillips and Miss Cole in 1895; and *Ruellia discifolia* Oliver (from Sok Soda and Wagga Mountains), discovered by Messrs. James and Thrupp.

STACHYS ALPINA *L.* IN BRITAIN.

By Cedric Bucknall, Mus. Bac. Oxon.

Within the last twenty years the botany of the district of the Bristol coal-field has been well investigated, but that corner of it into which the southern spurs of the Cotswold hills extend is comparatively unexplored, although it has enriched the local flora with many good plants. On the 30th of June of this year I made an excursion to a wooded hill near Wotton-under-Edge, the upper part of which consists of upper lias sands capped with oolitic limestone, and is between 600 and 700 ft. high. A part of the underwood had been cut within the last year or two, and the ground was covered with a luxuriant growth of different species of *Hypericum*, *Rubus*, *Labiatæ*, &c. Amongst the latter was a *Stachys* which I at once recognized as different from any which I had seen in England, and on examination and comparison it proved to be *Stachys alpina* L., of which I had gathered specimens last year in Switzerland.

In the following week the locality was carefully examined by Mr. J. W. White and myself. We found the plant to be thinly scattered through the more open portions of the wood, and it occurred also in thickets below the wood and by a roadside lower down, on the lias sands; the whole area as at present known being less than a square mile. The plant has every appearance of being native, but if this be so, it may appear strange that it should hitherto have escaped notice. It must, however, be remembered that the visits of botanists who would be likely to notice such a plant being few and far between, and the coppice being probably only cut at intervals of fifteen or twenty years, it would be a matter of chance whether it was explored at a time when the plant could be seen without careful search. Moreover, it might be readily confounded with *S. sylvatica* or one of its hybrids; and this has in fact happened within the last few weeks, when the plant was submitted to an eminent botanist.

I am not aware that *S. alpina* has ever been met with in Britain as an introduced plant, and it seems most unlikely that, possessing no beauty or interest except to a botanist, it should have been deliberately sown or planted in many different places in such a locality.

With regard to its limited range, which will no doubt be extended on further search being made, a comparison may be made with several other plants which are confined to one or at most two limited areas in Britain, and have a similar distribution in neighbouring countries on the Continent: e.g. *Arabis stricta* (France, Spain), *Helianthemum polifolium* (France, Spain, Belgium), and *Cotoneaster integerrima* (France, Spain, Belgium, Scandinavia). *Stachys alpina* occurs in France, Spain, and Belgium.

In spite of its name, judging by its distribution and by the plants in whose company it is to be found, *S. alpina* is by no means an alpine plant. Amongst the species with which it is associated on the Gloucestershire hill are *Pyrus Aria*, *Valeriana Mikanii*, *Campanula glomerata*, *Stachys sylvatica*, *Polygonatum officinale* and *Convallaria majalis;* and it may be noted that, during a recent visit to South Tyrol in company with Mr. J. W. White, we met with *S. alpina* accompanied by all these plants.

Taking into account all the circumstances, Mr. White, who, as I have mentioned, has seen the plant growing both in Gloucestershire and in South Tyrol, fully concurs with me in the opinion that we are justified in looking upon *Stachys alpina* as an addition to the British flora.

NOTES ON SPECIES OF LOTUS § PEDROSIA.

By the Rev. R. P. Murray, M.A., F.L.S.

The Pedrosian species of *Lotus* present a very interesting study to any botanist who may find himself at the right time of year in any of the oceanic islands of the North Atlantic; at least in Madeira, the Canaries, or the Cape Verds. One species only seems to reach the Azores. The text-book for Madeira is of course Lowe's *Flora of Madeira*, while many of the Canarian forms are described and figured in Webb and Berthelot's well-known *Phytographia Canariensis*. The Cape Verd species I only know from herbarium specimens and from Webb's *Spicilegia Gorgonea*.

Each group of islands possesses its own peculiar species. *Lotus glaucus* is common to Madeira and the Canaries, and *L. argyrodes* to Madeira and the Azores. *L. arenarius*, a plant of Spain, Portugal, and North-west Africa, and the only European * *Pedrosia*, is found also in the Canaries. *L. maroccanus* Ball is endemic in Marocco.

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* *Lotus Salzmanni* Boiss. et Reut., judging from a specimen sent out by Messrs. Porta and Rigo under this name (No. 82, iter iii. hispanicum, 1891), shows a distinct approach to *Pedrosia* in the character of the style.

Lotus glaucus Ait. This is quite the most common of the species, occurring both in Madeira and the Canaries, though it does not reach either the Azores or Cape Verd islands. The plant sent from the last-named group under this name is, I believe, quite distinct, and has been described under the name of *L. Bollei* by Dr. H. Christ in Engler's *Bot. Jahrbücher* ix. 123 (1887).

Generally a well-marked species, easily recognisable, but several slightly varying forms have been described as species. The typical plant is quite prostrate, forming a dense mat of entangled branches, with short peduncles rarely exceeding three-quarters of an inch in length, and stipules similar to the leaflets in size and shape.

This is the common plant of the Madeira coast, and I cannot distinguish from it *Pedrosia leptophylla*, under which name Lowe describes the grand Canarian form of the species. It is true that of *P. leptophylla* it is said "foliolis stipulisque subdifformibus," but I can find no other difference, and a careful examination of Madeira specimens will show many instances in which the same character may be observed.

Pedrosia tenella Lowe (Tenerife) differs by "its peculiar bristly or hispidulous pubescence spreading or reflexed on the branches and fringing the leaflets," but this character is variable, and at most it can only be considered as a slight variety or local form.

P. neglecta Lowe (Madeira) differs considerably in habit, has stipules unlike the leaflets, and longer peduncles (one to three inches); but is probably only a very marked variety of *L. glaucus*.

P. florida Lowe (Porto Santo) seems to be a mere local state of *L. glaucus*, and appears from a paragraph in *Flora of Madeira*, 178, to have been finally discarded as a species by its author.

Lotus glaucus Ait. var. nov. angustifolius. Prostrate, much branched, the branches not interlacing. Leaves all distinctly stalked, the petioles mostly 1–2 lines long; leaflets linear acute or narrowly obovate-cuneate, three or four times longer than broad; stipules similar, but smaller, exceeding the petiole.

A very striking plant when well marked, but a long series shows many intermediate forms connecting it with ordinary *L. glaucus*. Gran Canaria: Caldera de Bandama, Ginamar, Las Palmas, Gando. Here also, I think, may be best placed a curious plant which I once found on coast rocks between S. Cruz and S. Andres, Tenerife.

In habit and general appearance this variety bears much the same resemblance to the type that *L. tenuis* Kit. bears to *L. corniculatus* L. *Lotus glaucus* seems never to be found far from the sea. It occurs in Madeira and the adjoining islets, and in Tenerife, Gran Canaria, and Fuerteventura.

Lotus salvagensis, n. sp. or n. var.—Biennial, procumbent, with numerous branched stems, clothed with short adpressed hairs, becoming bald below. Leaves very shortly petioled, leaflets and stipules dissimilar. Leaflets narrowly obovate, about three times as long as broad (not six to eight times, as in *Pedrosia Pairæ* Lowe), subpetiolate, clothed with scattered adpressed hairs. Stipules exceeding the petiole, unequal sided, generally markedly so, rather acute, broader below, distinctly subpetiolate. Peduncles very short, hardly exceeding ¼ in. in length, 1- to 3- or 4-flowered (in the specimens before me nearly all 2-flowered). Flowers yellow. Bract normally trifoliate. Calyx clothed with adpressed hairs, subbilabiate, teeth subulate, about as long as the tube. Style with a short but very distinct tooth. Stigma capitate. Pod about ¾ in. long, straight, rather thick, more or less strangulate from abortion of seeds, which are about twelve to fifteen in number in the specimens before me.

Salvages (Grand Piton); apparently common. Collected by Ogilvey Grant, Esq., in May, 1895.

Very distinct from *Pedrosia Paivæ*, judging from Lowe's description and from the specimens (which are in very poor condition) at Kew. I should have referred these to ordinary *L. glaucus*. No doubt *L. salvagensis* comes also very near that species, if taken in an extended sense, but even so it seems to be sufficiently distinct to be kept apart. In the structure of the stipules it approaches *Pedrosia neglecta* Lowe, but differs markedly in the extremely short peduncles, a character in which it resembles *P. Paivæ*, and which led Lowe (in the absence of flowers) to surmise that the last-mentioned form belonged to the group of which *L. macranthus* Lowe may be taken as the type. But I can see no valid ground for this suggestion.

Lotus sessilifolius DC. DeCandolle remarks that this species is allied to *L. glaucus*, but differs by its perennial habit, shrubby stem, longer and narrower leaves, larger and more numerous flowers, and cylindrical pods. I doubt whether any of these characters can be absolutely depended on except the perennial habit and somewhat shrubby stems. The leaves of *L. glaucus* var. *angustifolius* sometimes hardly differ from those of *L. sessilifolius* except in being stalked, while I have occasionally, though very rarely, found plants of *L. sessilifolius* with a few of the leaves with a distinct though short petiole. The floral characters are still less to be depended on. However, the habit and general appearance of the plant is very different from that of *L. glaucus*, and I have no doubt that it is a good species. It is quite confined to the Canarian archipelago, occurring, always in maritime or submaritime situations, in Tenerife (Guimar, S. Cruz, S. Juan de la Rambla). It is also reported from Hierro (Bourgeau, 798) and from Gomera (near S. Sebastiano), but these plants require further study. The plant from S. Juan de la Rambla is remarkable for the very silky-villous clothing of the calyx, and for a tendency to produce a certain number of more or less spathulate leaves.

Lotus lanzerottensis Webb & Berth. Another species of the *glaucus* group, but readily distinguishable from *L. glaucus* by the broad obcordate leaflets and roundish or obcordate-rhomboid subpetiolate stipules, recalling those of *L. salvagensis*. The clothing of the leaves recalls *L. sessilifolius*.

Canaries: only in the islands of Lanzerote and Fuerteventura, from the latter of which a var. *villosa* is recorded in *Phyt. Can.*

Lotus dumetorum (Webb MS.) Bourgeau 803, 1321, 1322. Perennial, erect or ascending, much branched, sparingly pilose with adpressed hairs. Leaves shortly but distinctly stalked, clothed with adpressed hairs, leaflets oblanceolate; stipules similar to the leaflets, much exceeding the petiole, subpetiolate; peduncles 10–15 lines long; bract normally trifoliate; heads conspicuous, 3- to 5- or 6-flowered, yellow; calyx bilabiate, teeth subulate, exceeding the tube; pod linear, cylindric, torulose, often strangulate, 5- to 12- or 14-seeded.

Tenerife (Anaga Hills, Bufadero, Taganana). These localities are all close together.

A very curious plant, known only, as I believe, from Bourgeau's specimens, until I refound it a few years since on the Anaga Hills. Cosson suggested that it might be a variety of *L. arenarius* Brot., and this view was adopted by Ball, who identified it with a plant collected in Marocco, and gave it the varietal name of *Webbii*, remarking "differt a specie habitu procumbente, herba hirsutissima incana, foliis minoribus, sed characteres graviores satis constantes non video." This, however, does not at all suit the Tenerife plant, and I cannot help suspecting that some confusion has occurred. At all events the varietal name "*Webbii*" must disappear, so far as the Tenerife plant is concerned. Lowe (*Flora of Madeira*, 176) thinks that "there seems less objection to 'Bourgeau's plants' being regarded as extremely luxuriant states or varieties of *L. glaucus* Ait."; but inclining rather to consider them as "constituting a distinct and undescribed species." The perennial habit with distinct woody rootstock seems by itself at once to remove *L. dumetorum* from all connexion with *L. arenarius*, which is, I believe, strictly annual. The stipules, also, are very different. Nor, after studying the magnificent specimens which I collected in June, 1894, on the Anaga Hills, can I consent to regard it as only a luxuriant state of *L. glaucus*. It is suffrutescent, not biennial, and other differences may be found, especially in the leaves, stipules, and calyx, which compel me to treat it as a distinct species.

Lotus emeroides, n. sp.—Perennial or subperennial, much branched, sparingly villose-pubescent. Leaves distinctly stalked; leaflets roundish obovate, about 3 in. long; stipules resembling the leaves, but smaller, subpetiolate, equalling or exceeding the petiole. Peduncles 1–2 in. long; bract trifoliate; heads 3–4-flowered, flowers yellow, rather large; calyx hairy only on the ribs, bilabiate, teeth ciliate, 2 superior triangular-lanceolate, 3 inferior (shorter) subulate-lanceolate, all longer than the tube; style flattened, the tooth very distinct. Pods short, about an inch long, slightly winged, almost as in *L. siliquosus*, torulose, often strangulate, 8–10-seeded. Seeds (immature) testaceous.

Gomera (Degollada de S. Sebastiano, on rocks; near Hermigua, in bushy ground).

There is a specimen of this plant in herb. Webb (Florence), collected near Hermigua "in arvis," to which the MS. name of *emeroides* is appended. I have therefore adopted it as the specific name.

Lotus arenarius Brot. This species is recorded from Palma (Fuencaliente) in *Phyt. Can.* The only specimen which I have seen is scrappy, and perhaps hardly sufficient for a satisfactory identification if it stood alone. But in June, 1892, I found specimens about the Combrecita (3800 ft.) in the same island, which seem to me indistinguishable from certain Portuguese plants collected near Cintra, which must, at least for the present, be placed under *L. arenarius*, though from the description in the *Prodromus Floræ Hispanicæ* they should be very near *L. canescens* Kze., but as I have never seen authentic examples of this plant, I am afraid to speak more definitely.

In his essay on Canarian botany (Engler's *Bot. Jahrbücher*, ix. 1887) Dr. Christ has described a new species of *Lotus* from Palma (Barranco de Angustias, where it was collected by Hillebrand) under the name of *L. Hillebrandii*. This he treats as intermediate between *L. spartioides* and *L. arenarius*, quoting from Hillebrand's notes: "Affinis *L. spartioidei* Webb et *arenarii* Brot. erectus"; and adding, after a long diagnosis, "*L. spartioides* Webb *Phyt.* 81 differt statura altiore diffusa, foliis minoribus sericeis linearibus stipulis conformibus, pedunculis tenuibus paucifloris, capitulis folio trifoliato suffultis. *L. arenarius* Brot. differt caule decumbente foliolis obovatis pube breviori, calycis dentibus lanceolatis vexillo breviore, legumine minus nodoso." I have seen the types, and, except in one particular, they seem to be identical with my Combrecita plant. I can see no resemblance whatever to *L. spartioides*, and suspect that neither Dr. Hillebrand nor Dr. Christ had much acquaintance with that species, except from description, or from herbarium "scraps." The erect habit ascribed to the plant may easily have been accidental. There remains only the absence of a floral bract, which is certainly curious. But it is a somewhat variable character in other species of the genus. It is strange that Dr. Christ in the same essay says of *L. arenarius* "capitulis floralibus aphyllis," which as a general statement is certainly incorrect. I have therefore no hesitation in considering *L. Hillebrandii* as identical with my Combrecita plant, which I believe to be a marked form or subspecies of *L. arenarius* Brot.

Lotus campylocladus Webb & Berth. A difficult and apparently little known species, which seems to have been confused, sometimes with *L. holosericeus*, sometimes with *L. arenarius*. I suspect that it is confined to Tenerife, though there is a scrap from Palma so named in herb. Webb. This probably belongs to *L. arenarius.*

The original description in *Phyt. Can.* is as follows:—"L. villosus, foliis breviter petiolatis, foliolis anguste obovato-cuneatis; stipulis ovatis petiolo subbrevioribus, calyce ultra medium diviso, laciniis lineari-lanceolatis, apice subulatis, stylo 1-dentato." I find, however, that the stipules equal or exceed the petiole, and are subpetiolate. The habit is more or less prostrate or ascending; the colour a curious ashy green From *L. holosericeus* this species may be readily distinguished by its much less erect habit, the stipules unlike the leaflets, which are frequently retuse, and by the much less forward direction assumed by the lateral leaflets. From *L. arenarius* it differs by the shape of the stipules, the much smaller leaves, and by its biennial (? subperennial) duration. Nevertheless several authors (Webb, Masferrer, Colmeiro) agree in thinking that it is almost too closely allied, and may perhaps be only of subspecific rank. For the present, however, it seems better to retain it as distinct.

Bourgeau's *L. holosericeus* of Pl. Can. 1325 is, judging from my specimen, really *L. campylocladus.* It was collected in Tenerife (Cañadas del Teyde, in rupibus). I collected it, once only, among loose pumice above Guimar in the same island at about 4500 ft.

LOTUS HOLOSERICEUS Webb & Berth. One of the most striking and distinct of the group. Probably quite confined to Gran Canaria, and extremely local even there. The type specimens were found near Mogan, and I have collected it in the same neighbourhood, and also near Tiraxana. This would give a range of 2000–3000 ft. above sea-level.

This species may be easily known from *L. campylocladus* by its more erect habit, by the very beautiful silky-villose clothing of the whole plant, and by the stipules similar to the leaflets. The lateral leaflets are markedly assurgent, *i.e.* lying almost close to the terminal leaflet, instead of spreading at right angles. Webb notes: "Foliola inferiora petiolata, superiora subsessilia."

In herb. Webb a plant from Palma (Caldera) is labelled *L. holosericeus;* I have no note about it, but have little doubt that it is really *L. arenarius.* And in herb. Schinz there is a specimen from S. Juan de la Rambla in Tenerife also labelled *L. holosericeus.* Unless my memory deceives me, it really belongs to an aberrant form of *L. sessilifolius*, which I have myself collected in the same locality.

LOTUS SPARTIOIDES Webb & Berth. This species, like the last, is confined to Gran Canaria, where it seems to be exceedingly rare. I have only once seen it; on the mountain side near Artenara, at above 4000 ft. It formed a large patch, several feet across, and being in full flower was conspicuous at a distance of nearly a quarter of a mile.

Very distinct from every other species; it is recognizable at once by its shrubby habit, distinctly stalked leaves, linear leaflets and stipules, lateral leaflets forming an acute angle with the terminal, long peduncles, furnished with an inconspicuous, often unifoliate, floral bract, and linear-lanceolate setaceous calyx teeth.

LOTUS ARGYRODES. I venture to propose this name for the Porto Santo and Madeira plant described by Lowe (Hook. *J. Bot.* viii. 293) under the name of *Pedrosia argentea* (*Lotus argenteus* Masferrer, 1880). Unfortunately this name had been already used to designate an Egyptian and totally different species, viz. *Lotus argenteus* Webb & Berth. = *Dorycnium argenteum* Delile. A new name is therefore necessary.

The range of the species is somewhat peculiar. It occurs (but rarely) along a line of somewhat over thirty miles from Porto Santo to the Desertas, just touching the extreme eastern point of Madeira half way between them. Its only other known habitat is in the island of S. Mary, one of the Azores, whence it was sent by the late Mr. T. C. Hunt. Through (as I suppose) quoting from memory, Watson has recorded this plant in Godman's *The Azores* under the name of "*Pedrosia macrantha* Lowe?"; adding, "Whether this be the *mácrantha* or *argentea* of Lowe, I cannot absolutely determine, though the long and decidedly stalked legumes seem to place the Azore specimens under the former name." But a reference to the *Flora of Madeira* shows that the stalked legumes are characteristic of *P. argentea*, i.e. *Lotus argyrodes*, not of *L. macranthus*. And my own specimen from the Azores (T. C. Hunt, 1848) agrees perfectly with Madeira *L. argyrodes*, and not at all with *L. macranthus*, which should therefore be erased from the Azores Flora.

OBSERVATIONS ON PLANT PLANKTON.*

By George Murray, F.R.S.

At the request of the Board I have carried out a series of observations on the minute free-floating vegetation, especially of the west coast. The importance of a study of such organisms, as the basis of nutrition of all life in the sea, has long been recognised, but very little has hitherto been done in the way of investigation. The main observations were made [in 1896] on board the 'Garland' in three series, *viz.* the first from 26th March to 6th April; the second from 28th July to 15th August; and the third from 2nd December to 8th December. In March to April, the observations were made in the North Sea, and on the west coast of Loch Linnhe, the Sound of Jura, and principally in the Clyde sea-area. In July to August a week was spent in visiting the former stations and others in the Clyde sea-area, and the remaining time in the Sound of Islay, Sound of Jura, Firth of Lorn, Loch Etive, Loch Linnhe, Loch Aber, Sound of Mull, the sea round Rum, Eigg, and Ardnamurchan, Loch Nevis, Loch Hourn, Raasay Sound, &c. In December, observations were made in Loch Aber, Loch Linnhe, Firth of Lorn, and the Clyde sea-area. The material obtained at these times was all preserved, and its working out in detail occupied me for a considerable period in London.

Methods.—In addition to tow-netting with fine silk nets—the method of capture usually employed—I have made use of a cylindrical silk bag, about 1½ feet long and 3 or 4 inches wide. This was tied to the nozzle of the hose, there being a lateral overflow vent near the top of the bag; and, on pumping through it with the donkey engine from an intake pipe 8 feet below the surface, good results were obtained. This method, first employed by Dr. John Murray, enables one to work when steaming, and is often convenient in weather that is too rough for tow-netting. The fixing and preservative employed was a 0·5 per cent. aqueous solution of chromic acid; good results have also been obtained from Fleming's solution and from platinic chloride of various strengths. I carried tubes half filled with the chromic acid solution, which is about the same density as ordinary sea-water. The diatoms, &c., were turned out of the tow-net into a glass-jar, and allowed to settle for some time. They were then collected from the bottom by means of a dipping-tube, and added to the chromic acid solution. Several times during summer, while working in haste and having large quantities of diatoms to deal with, I removed some *en masse* with a spoon from the tail of the net to the chromic acid solution. The addition of a mass of diatoms, without the proper proportion of sea-water, proved to be a mistake, since the contents of the cells were disorganised in these cases.

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Distribution.—The seasonal occurrence of diatoms in vast numbers in the sea has long been known, but no observations have been made that afford a satisfactory explanation of the causes that contribute to the phenomenon. On both the east and west coast, during the first months of the year, there is a remarkable prevalence of diatom life. We have no knowledge of the distance out in the Atlantic to which this extends, but in the coastal waters at this season the abundance of diatoms is extraordinary. Towards the end of March and beginning of April, the quantity diminishes, and for the rest of the year diatoms remain at a fairly constant quantity, except for here and there the occurrence of definite local banks of them. *Peridinieæ*, especially the species of *Ceratium*, are very few in number during the maximum period of diatom life, but they come upon the scene with the waning of the diatom season, reach a maximum about August, and linger on in fair quantities until December at least. Early in April, during four or five days' work in Loch Fyne, when diatoms were exceedingly plentiful, I succeeded in obtaining only one specimen of *Ceratium Tripos*, which, at other seasons, especially summer, is the predominant plant organism in the western lochs. During the period of most active diatom life, the surface of the sea is almost monopolised by a diatom *Skeletonema costatum;* while species of *Coscinodiscus*, *Biddulphia*, *Ditylum*, *Rhizosolenia*, &c., abound in the layers beneath, the greatest quantity of these being generally obtained at 5 fathoms, very few below 25 fathoms. The surface of the Clyde sea-area so teemed with *Skeletonema* in April that a tow-net could be one-third filled in a few minutes with a scum consisting of it and other diatoms in smaller quantity. When I revisited the same stations in the end of July, I could not obtain a single *Skeletonema*, and its absence (at all depths) continued to puzzle me during my examination of the west coast in August, except for a few specimens obtained near Oban, and its remarkable occurrence in this, Loch Etive. While (with this one exception) it could not be found outside, the surface of Loch Etive simply swarmed with *Skeletonema* in abundance, equal to if not greater than that of the Clyde sea-area in spring. While it occurred as a surface organism in spring, it was far more plentiful in Loch Etive at 5 fathoms than at the surface in summer. There was no local, low temperature condition that would serve to explain this, Loch Etive being, in point of fact, nearly two degrees warmer than the sea outside. In its greater abundance at 5 fathoms than at the surface it agrees with all other diatoms during the summer and winter,—at all seasons, in fact, except during the period of maximum occurrence. If one sets nets at the surface, 5 fathoms, 10 fathoms, and 20 fathoms, the result will be the greatest capture of diatoms in general at 5 fathoms, a nearly equal (smaller) quantity (often of the very same organisms) at the surface, and at 10 fathoms, and a much slighter quantity at 20 fathoms. Excluding March and April, I found no notable exception to this rule, except in several hauls in December, in the Dunoon basin, when I obtained more from 10 than from 5 fathoms. From the character of the special pigment *diatomine*, which masks the chlorophyll in diatoms, and its resemblance to the corresponding pigment in *Phæophyceæ*, one would expect this vertical distribution of diatom life, since its maximum occurrence is nearly at the same depth beneath the surface as the Laminarian zone. It is plain that free-floating organisms like diatoms, from being subject to currents and immersions of layers of water, must be liable and adaptable to certain changes of depth, and to the varying quantity and quality of sunlight that reaches them at such depths, just as shore algæ are subject to such periodical changes in the rise and fall of the tides.

In March to April, the plant plankton of the east coast, judging by a hurried examination of it in bad weather, closely resembled that of the west coast outside the Clyde sea-area. The characteristic diatoms were, in the order of their abundance, *Coscinodiscus concinnus*, *Chætoceros borealis*, *Ditylum Brightwellii*, *Chætoceros decipiens*, *Rhizosolenia Shrubsolii*, *Skeletonema costatum*, and *Coscinodiscus radiatus;* while, of other organisms, *Ceratium Tripos*, in places here and there, almost rivalled *Ditylum*, but generally was about equal to *Rhizosolenia*. On entering the Clyde sea-area, however, *Ceratium* became much more scarce; and in Loch Fyne, as said above, only one specimen was obtained in several days' tow-netting. On the other hand, *Skeletonema*, from being scarce, at once leapt easily into first place, far exceeding any other Clyde diatom; *Coscinodiscus concinnus* also became far more plentiful; and both species of *Chætoceros*, named above, also increased greatly. There were numbers of other diatoms, now present, now absent, but these were the forms characteristic of the season. In summer, while diatom life was scarcer, there was a much greater variety of forms; but only in the Sound of Mull and in Loch Etive an approach to the quantities obtained in the Clyde in spring. I sent nine typical tubes to Professor Cleve, who has kindly favoured me with the report on them in the accompanying table.

These diatoms and their distribution were fairly typical of all the localities, now one form, now another, varying in abundance; but *Chætoceros curvisetus*, *C. decipiens*, *C. didymus*, *Rhizosolenia Shrubsolii*, *Coscinodiscus concinnus*, *Eucampia zodiacus*, and *Stephanopyxis Turris* being the prevalent forms. Professor Cleve noted that the fronds of *C. curvisetus* were spore-bearing,—a fact which I had independently noted in this species, as well as in *C. borealis* and *C. constrictus.* In addition to the diatoms, and, as a rule, far exceeding them in total bulk, were the species of *Ceratium*. *C. Tripos*, *C. Fusus*, and *C. Furca* were all three present in nearly every haul of the nets, especially the first two species. Sometimes one predominated, sometimes the other; but, as a general rule, *C. Tripos* prevailed in the Clyde sea-area, and *C. Fusus* in the northern lochs, but never to the exclusion of the other.

× = dead fragments. rr = very rare. cc = very common.
r = rare. c = common. + = not rare.

	Sound of Mull, Tobermory.	Sound of Mull, Tobermory.	Sound of Mull, Barony Point. Surface.	Sound of Mull, Barony Point. 5 fathoms.	Rum to Ardnamurchan.	Loch Nevis.	Loch Hourn.	Loch Etive.	Loch Aber.
Bacteriastrum varians Laud. . .					× r		× r		
Cerataulina Bergonii Per. . .		r		rr	r				
Chætoceros borealis Bail. . .					r	+	r		
,, *commutatus* Cl. . .	+	r		r	+			+	
,, *constrictus* Gran . .								r	
,, *contortus* Schütt . .	+				+	+		+	
,, *criophilus* Cast. . .					r				
,, *curvisetus* Cl. . .	cc	cc	cc	cc	cc		r	c	cc
,, *debilis* Cl. . . .	+	c	+		+				+
,, *decipiens* Cl. . . .	+	c	+	+	+	+	c	+	
,, *didymus* Ehr. . .	c	r	+	+	c	+	r	r	+
,, *diadema* Gran . .	r		+		r				
,, *septentrionalis* Oestr. .					r			r	
,, *scolopendra* Cl. . .								× r	
Coscinodiscus concinnus W. Sm. .		r	r	r	r			r	r
,, *excentricus* Ehr. .					r			r	r
,, *radiatus* Ehr. . .					r		r	r	r
Ditylum Brightwellii Grun. . .	r				r			r	
Eucampia zodiacus Ehr. . . .	c	r	+	+	+			c	+
,, *groenlandica* Cl. . .								r	
Fragilaria striatula Grev. . .								r	
Guinardia flaccida Per. . . .	r	r	r		r	r	r		r
Lauderia annulata Cl. . . .					rr				
Leptocylindrus danicus Cl. . .		r	r	r	r				
Navicula membranacea Cl. . .					r				
Rhizosolenia setigera Brightw. .	r			rr	+			+	
,, *Shrubsolii* Cl. . .	+	r	+	+	+	+	+	+	+
,, *Stolterfothii* Per. .		rr	+		r				
,, *pungens* Cl. . .		+		+	r		+	+	
Roperia tessellata Grun. . .					r			r	
Skeletonema costatum Cl. . .								cc	
Stephanopyxis Turris Ralfs. . .	+	r	+	r	c	c	+	+	+
Thalassiosira Nordenskioldii Cl. .	rr				r				
,, *gravida* Cl. . .		rr							
Thalassiothrix longissima Cl. et Grun.	rr								

In December, on the west coast outside the Clyde sea-area, the characteristic diatoms were *Coscinodiscus concinnus*, *Biddulphia mobiliensis*, *Ditylum Brightwellii*, while species of *Chætoceros* and *Navicula* were casually present. Both *Ceratium Tripos* and *C. Fusus* appeared sparingly in all the captures. Within the Clyde area, *Skeletonema* became next abundant to *Coscinodiscus*, after it *Biddulphia*, and next *Chætoceros decipiens*, while *Ceratium Tripos* and *C. Fusus* were more plentiful than in the waters outside. Compared with these, other diatoms and plant organisms were of purely casual occurrence. These appeared more or less in every haul of the nets, and in fairly steady proportions, as cited. Not a single specimen of *Rhizosolenia* was obtained in December, while sometimes in August it was the predominant generic form, *e.g.* in Kilbrennan Sound.

At all seasons of the year, especially near the shore, a small proportion of the diatoms captured are dead, their cell-contents either disorganised or gone. This is particularly noticeable in such large forms as *Coscinodiscus concinnus* and *Biddulphia mobiliensis*; but it occurs frequently in other forms, such as *Chætoceros decipiens*, and, above all, in *Skeletonema costatum*. I believe this phenomenon, which at first puzzled me greatly, to be due to the decline or loss of salinity of the water. My reasons for this belief are these: Such diatoms are mostly found at or near the surface and in the vicinity of land where a considerable mixture of fresh with salt water occurs. This may be seen in any of our western sea lochs, especially after rains, where a sheet of practically fresh water lies on the top very slowly mixing with the salt water. It is well known that seaweeds, in general, are extremely sensitive to variations in the degree of salinity. My belief is strengthened by the following observation: In April, on ascending Loch Fyne, the nearer we came to the top the larger the quantity of dead diatoms were found. This was particularly noticeable in *Skeletonema*, which almost monopolised the surface; and on tow-netting in the waters between Inveraray and Cairndhu at the head of the loch, where there was a thick sheet of fresh water on the surface, owing to recent heavy rains, it was impossible to find a living cell in the vast mass of *Skeletonema*. This observation was confirmed in Loch Etive in summer. This loch was full of *Skeletonema*, some at the surface, but most in from 3 to 5 fathoms. A large quantity of fresh water was entering the loch, and the diatoms at the surface were in large proportion dead, while those in the lower layers were living. The observation is the more noteworthy, as I am led by other reasons to think this diatom mostly abounds in waters of a fairly low degree of salinity, and I have elsewhere taken the low degree of salinity of this loch in August as possibly accounting for the presence of *Skeletonema* in it at that season. However, this last idea is a purely speculative one, and does not in any way affect my general contention that the great numbers of dead diatoms in the sea are to be accounted for by the addition of fresh waters.

Diatoms as Food of Marine Animals.—When we reflect that the whole bulk of animal life in the ocean must be dependent on the vegetation of the ocean, it will be at once apparent that the small fringe of visible vegetation on the shallow bottoms round coasts cannot in the least degree suffice for the sustenance of the teeming animal life, which not only extends over the surface, but ranges into the depths. This *rôle* must be played almost entirely by the minute plant organisms, diatoms, *Protococcaceæ*, *Oscillatorieæ*, *Peridinieæ*, Coccospheres, Rhabdospheres, &c., which inhabit the surface layers down to 30 to 50 fathoms. Such organisms have been recorded from polar, temperate, and equatorial seas, sometimes in vast shoals, discolouring the water, but always found to be present when suitable apparatus is used for their capture. Their economic importance to the fisheries is therefore of a direct and vital character. We know that the stomachs of *Holothuriæ*, Ascidians, *Salpæ;* oysters, scallops, whelks, and other molluscs; crabs, lobsters, and other large crustacea, and even full grown fishes, have formed the happy hunting-grounds of diatomists in search of material; but direct evidence has been wanting of the use of diatoms as a matter of daily food by animals in the sea. Observing that the excreta of copepoda and other small crustacea, largely fed upon by fishes, were in many cases tinged with a faint colour like diatomine, I subjected them in many cases to a minute microscopic analysis, with the result that nearly the whole could be resolved into minute fragments of diatom frustules and their chromatophores. In many cases, it was surprising to note that the chromatophores had passed through, almost unchanged in shape, and even retaining faintly their colour. It was, in fact, often possible, from the characteristic shapes of the chromatophores, and the minute finely sculptured fragments of frustules, to recognize them as belonging to diatoms found in the same capture. In a few cases it was possible to detect a whole unbroken diatom-cell within the crustacean, but almost invariably the diatoms were reduced to fine fragments. *Coscinodiscus* and *Skeletonema* were the usual forms found, and these were the prevalent forms in the sea when my observations were being made.

It appears, then, to be clear that the animals which are themselves an important constituent of the food of fishes live in turn largely on diatoms. It has always seemed to me very highly probable that young fishes eat diatoms directly; and, in order to put this to the test, Dr. Wemyss Fulton sent me some young sand-eels, taken in tow-net, fifteen miles off Aberdeen, on 16th May, 1894; some young flat-fish (? plaice), taken off Montrose, 21st May, 1894; and some very small clupeoid fishes, taken 30th March, 1889. They were preserved in spirit. After burning a few of each in platinum crucibles, the ash was examined, and diatoms discovered in every case. Four different genera, *viz. Skeletonema*, *Eucampia*, *Melosira*, and *Chætoceros*, were found in the sand-eels; *Skeletonema* and *Nitzschia* in the flat-fish (in both cases *Skeletonema* was predominant); and *Coscinodiscus* (abundant) and *Melosira* (very rare) in the young clupeoids. In each case, complete valves (in *Skeletonema*, chains of several cells) were found, which appears to indicate that they were eaten directly by the fish themselves, and not within the bodies of small crustacea; in this latter case, they would have been broken up into minute fragments.*

During summer, I made a long series of attempts to discover whether the species of *Ceratium*, then so abundant in the sea, furnished a constituent of the food of small crustacea, but without result. In the first place, *Ceratium* could hardly be traced so easily as diatoms, and the matter is one of difficulty. Direct observations also yielded no result. I made an estimate of the relative abundance of diatoms, of species of *Ceratium*, and of animal life in all the captures, and I found a certain constancy in the proportions in the great majority of cases. When there were plenty of diatoms, there were *always* plenty of crustacea; when *Ceratium* predominated, and diatoms were scarce, there was little animal life. (In Loch Fyne, in July, I made two almost pure captures of *Ceratium Tripos* —merely one or two diatoms and copepoda mixed with it.) These facts, however, are merely suggestive. There is one more suggestion I should like to make. The spines of *Ceratium* may be a protection against being eaten. I could not fail to remark that there were no traces of spiny diatoms, such as the species of *Chætoceros*, having been eaten by small crustacea, though they were abundant in the sea. Against these negative observations, however, may be placed the fact that I found *Chætoceros* in the young sand-eels. Though one can suggest other uses for the spines and sharp projections of diatoms, especially the hollow spines of *Chætoceros*, it may yet be that they are a defence against crustacea, &c., as well, and this may be equally true of *Ceratium*. At all events, I failed to find evidence of *Ceratium* being eaten, though it was diligently sought for; and repeated observations and estimates appeared to point to there being a balance between the quantities of diatoms and animals, irrespective of *Ceratium*.

Reproduction of Diatoms.—In the ordinary process of reproduction, a diatom-cell divides into two cells, which resemble the parent; and, in most cases, the successive generations remain attached to each other in chains of individuals. Since the division takes place at the girdle where one-half of the wall overlaps the other, and each succeeding generation is similarly overlapped, and since (unless, perhaps, in a free state) there is no subsequent superficial growth, each succeeding generation is diminished in size by the thickness of the girdle membrane. When a minimum size is reached, diatoms become re-established at the maximum by the formation (in various ways) of auxospores. Mr. Comber has called attention (*Jour. Roy. Micr. Soc.*, October, 1896) to the formation in certain diatoms of "Endocysts" resulting in the production of a dimorphic form, and Prof. Cleve has recorded the presence of a specimen of *Biddulphia aurita* within another,—the internal one being considerably smaller, and having no spines (*Bihang till K. Svenska Vet. Akad. Handlingar*, Bd. i., No. 13). Besides these modes of reproduction, nothing was certainly known of any mode of multiplication until the observations I was enabled to make in spring and summer on board the 'Garland.' The minute botanical details and considerations have been discussed at length in a paper published, by permission of the Board, in the *Proceedings of the Royal Society of Edinburgh* (vol. xxi. p. 207, plates i.–iii.).

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* The late Dr. R. Brown in a paper "On the Nature of the Discolouration of the Arctic Seas" (*Trans. Bot. Soc. Edin.*, vol. ix. p. 244, 1868), was the first, so far as I know, to point out that this discolouration is due to the presence of large masses of diatoms. He found these diatoms within the *Pteropoda*, *Medusæ*, and *Entomostraca* that compose the "whale's food."

With reference to the association of diatoms with the food of fishes, Prof. M'Intosh refers me to the Seventh Annual Report of the Board, in which he anticipates my observations. At p. 272 (part iii.) he notes the occurrence of Appendicularians with *Rhizosolenia*. He says, "The stomachs of these were distended by chlorophyll granules, the same appearing in the fœcal pellets, both in the intestine and when discharged." I regret that his observation was unknown to me, and that I therefore did not cite it in my paper in *Proc. Roy. Soc. Edin.* The main point, however, is the full and complete establishment of the truth; and, since my observations were made in entire ignorance of his, this confirmation is all the more satisfactory.

It was discovered in *Biddulphia mobiliensis* that the cell-contents contract and round themselves off, this more or less spherical body proceeding to secrete a membrane of approximately the same shape as the parent, but without the characteristic external spines, &c. This body is apparently of the same character as that recorded by Prof. Cleve in *B. aurita* (of which I was ignorant at the time). During summer, I found these internal bodies free in the water in large numbers, and in a state of active division, none of them having developed the characteristic external spines of the parent form. The parent form was almost wholly absent. In December, again, the parent form (with spines) was abundant, but none of the summer forms. Presumably these had grown into mature *Biddulphia mobiliensis*, either directly, as is most likely, or after some other development. The production of this internal form, so far as I have seen, in *Biddulphia*, is always a case of rejuvenescence of the cell, the whole of the cell-contents of the parent being used up in the formation of one new cell, which, when free, increases its kind by division. I have observed similar rounding off in the cell-contents of *Ditylum Brightwellii*, and very probably it goes through a similar life-history.

In *Coscinodiscus concinnus*, I have also found a young form within the parent, this time exactly resembling it in all essential characters. In this genus also, therefore, we have the production of a new individual by the rejuvenescence of the cell. That this often happens in spring I had abundant evidence; but, what is more interesting, I have found in this species two diatoms within the parent, showing that the protoplasm must have divided to form them. In Loch Fyne I found other specimens of *C. concinnus*, of which the protoplasm had divided into four, eight, and sixteen rounded-off portions (produced, to judge by their positions, &c., by successive divisions into two); and free in the water at the same time, packets of eight and of sixteen young *Coscinodiscus concinnus*, of the same size as the rounded portions of protoplasm. The conclusion was inevitable that the packets of eight and of sixteen were produced from the rounded-off portions, having regard to the occurrence of single forms and pairs as described above. The membranes of the young individuals were either not silicified, or were imperfectly silicified, as proved by burning; and they were therefore capable of growth, and of attaining the full dimensions of *Coscinodiscus concinnus*, without the intervention of auxospores.

Both in spring and summer, I observed in several species of *Chætoceros* a series of divisions of the cell-contents, obviously similar to the divisions in *Coscinodiscus*, and doubtless preliminary to the formation of reproductive bodies. In *C. borealis* this sub-division of the contents is carried to four, eight, and sixteen; in *C. curvisetus* to four and eight; and in *C. constrictus* to four. Instances of higher numbers in the latter two species may and probably do occur, but they have escaped me. I have witnessed the actual processes of division up to four; but the farther sub-divisions into eight and into sixteen are known to me only from finding instances of them as accomplished facts. What the fate of these bodies may be I do not yet know, but I hazard the view that they resemble the corresponding bodies in *Coscinodiscus* in their life-history.

Having obtained a supply of sea-water, I am endeavouring to cultivate these organisms during the winter in two large tanks, and, if possible, to secure a continuous series of observations. There are enormous difficulties in cultivating such organisms in London, but so far I have a prospect of success.

There are numerous questions of both scientific and economic importance to be settled in connection with the study of marine vegetation. That little is known may be inferred from the fact that it was possible to make so many novel observations within so short a time. I would venture to recommend to the Board that a survey of the conditions be made farther out at sea, that we may know how far these banks of diatoms, *Peridinieæ*, &c., extend seawards, especially in the early months of the year and in summer, or how far they may be coastal in their occurrence.

MONOGRAPH OF THE BRITISH SPECIES OF EUPHRASIA.

Prefaced by an Epitome of Prof. Wettstein's Views on the Development and Distribution of the European Species.

By Frederick Townsend, M.A., F.L.S.

(Continued from p. 336.)

Part II.

Description and Distribution of Species, &c.

List of Native Species and of Hybrids.

Parvifloræ.

1. [*Euphrasia stricta* Host.]
2. *E. borealis* Towns.
3. *E. brevipila* Burn. et Grem.
4. *E. nemorosa* H. Mart.
5. *E. curta* Fries.
6. *E. occidentalis* Wettst.
7. [*E. latifolia* Pursh.]
8. *E. Foulaensis* Towns.
9. *E. gracilis* Fries.
10. *E. Scotica* Wettst.

GRANDIFLORÆ.

11. *E. Rostkoviana* Hayne. 12. *E. campestris* Jord.

ANGUSTIFOLIÆ.

13. *E. Salisburgensis* Funk.

HYBRIDÆ.

E. Rostkoviana × *nemorosa*
E. Rostkoviana × *brevipila*
E. gracilis × *brevipila*
E. occidentalis × *brevipila*
E. brevipila × *Scotica*
E. Scotica × *gracilis*

E. glanduligera Wetts.
E. notata Towns.
E. difformis Towns.
E. pratiuscula Towns.
E. venusta Towns.
E. electa Towns.

CLAVIS ANALYTICA.*

1 Bracteæ saltem in margine basin versus pilis glanduliferis obsitæ, sæpe totæ pilis glanduliferis plus minus obtectæ 2
Bracteæ nunquam pilis glanduliferis obsitæ . . . 6

2 Corolla 10–15 mm longa, fine anthesis tubo elongato . 3
Corolla 4–10 mm longa, fine anthesis tubo non elongato . 4

3 Rami infra medium caulis abeuntes. Folia caulina acuta, densiuscula, pilis glanduliferis longis obtecta. Floret ab Julio ad Octobrem . . . *E. Rostkoviana* Hayne.
Rami infra et supra medium caulis abeuntes. Folia caulina acuta, densiuscula. Pili glanduliferi breviusculi. Floret ab Juni usque ad Octobrem . (*E. campestris* Jord.)

4 Bracteæ non sensim in basin attenuatæ 5
Bracteæ sensim in basin cuneato-attenuatæ, setis robustis obsitæ hinc inde eglandulosæ. Species arctica fere circumpolaris . . . . . . (*E. latifolia* Pursh.)

5 Caulis plerumque infra medium ramosus 5–35 cm altus. Spica mox valde elongata. Folia caulina obtusa vel acuta. Bracteæ ovatæ aut basi breviter cuneatæ, dentibus cuspidatis vel aristatis. Corolla 5–10 mm longa violascens vel albida. Capsula cuneato-obovata, calycem æquans vel superans . . *E. brevipila* Burn. et Grem.
Caulis infra medium ramosus. Spica non elongata densa. Corolla 4–6 mm longa albida vel cærulea ? Bracteæ dense imbricatæ acutæ, dentibus acutis. Capsula elliptica calycem æquans vel excedens . . *E. occidentalis* Wettst.

6 Foliorum caulinorum superiorum lanceolata vel lanceolato-ovata longitudo latitudinem (exclusis dentibus) in minimo duplo superat plerumque valde superat. Corolla 6–8 mm longa alba, labio superiore cærulescente vel violascente rarius totæ lilacinæ. Capsulæ maturæ margine glabræ vel pilis sparsis inflexis obsitæ . *E. Salisburgensis* Funck.
Foliorum caulinorum superiorum longitudo latitudinem (exclusis dentibus) in maximo duplo superans, plerumque brevior. Capsulæ maturæ margine pilis strictis erectis obsitæ 7

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* The dimensions throughout are metrical.

7 Corolla dorso 10–15 mm fine anthesis plerumque elongata *E. Kerneri* Wettst.
Corolla 5–10 mm, fine anthesis non elongata Confer *E. brevipila* v. *subglabra.*
Corolla dorso 2–10 mm longa fine anthesis nunquam elongata 8

8 Corolla in speciminibus bene evolutis 7–10 mm longa . 9
Corolla in speciminibus bene evolutis 2–7 mm. longa . 10

9 Planta 5–20 cm. alta. Europeam boreali-occidentalem incolans; foliis caulinis superioribus obtusiusculis, dentibus obtusiusculis . . . . . . *E. borealis* Towns.
Plantæ 5–75 cm. altæ, foliis caulinis superioribus acutis, acute dentatis, in parte inferiore ramosus; bracteæ ovatæ vel obovato cuneatæ. Folia glabra vel in margine setulis papillisve minimis. Calyx fructifer non valde accretus (*E. stricta* Host.)

10 Folia et bracteæ glabra 11
Folia et bracteæ tota vel saltem in margine et in nervis paginæ inferiore setulosa 12

11 Caulis firmus, planta cca. 5–40 cm alta, bracteis distantibus, plerumque ramosissima planitiem vel montes non altos incolans; bracteæ dentibus acutis patentes . . *E. nemorosa* H. Mart.
Caulis tenuis, filiformis planta circa 3–20 cm alta, ramis paucis. Bracteæ erectæ, dentibus obtusiusculis, vel acutis, nitidæ . . . . *E. gracilis* Fries.

12 Folia setis albidis strictis dense obsita itaque griseo-viridia 13
Folia setis minimis margine et in nervis paginæ inferioris obsita, glabra videntur 14

13 Folia caulina obtusa. Bracteæ latæ basi cuneatæ setis longiusculis sparsis obsitæ. Planta arctica, fere circumpolaris . . . . (*E. latifolia* Pursh.)
Folia caulina superiora acuta. Bracteæ basi rotundatæ, setis brevibus dense obsitæ. Planta Europæ mediæ et borealis . . . . *E. curta* Fries.

14 Plantæ Europæ borealis et mediæ. Folia caulina superiora plerumque acuta . . . (Confer *E. occidentalis glabra*).
Folia caulina obtusa. Calyx capsula evidente brevior. Planta Europæ borealis, æstate florens *E. Foulaensis* Towns.

15 Planta Scotica, gracilis simplex vel parce ramosa. Capsula calycem æquans vel excedens . . . *E. Scotica* Wettst.
Planta Europæ mediæ crassus rarius tenuis plerumque in parte inferiore usque ad medium caulis ramosus. Conf. *E. curta* var. *glabrescens.*

I would preface the descriptive portion of this Monograph by stating that I have seen and determined all the specimens for which localities are given. The critical character of the species rendered this advisable. I regret that I have not had time or opportunity to consult more herbaria so as to have given more localities and rendered the knowledge of the distribution of the species more

complete. There can be no doubt that it will be many years before this knowledge will be obtained.

My best thanks are due to those botanists who have assisted me in communicating specimens; they are especially due to W. H. Beeby, Esq.; also to Messrs. Ar. Bennett, J. Britten, N. Colgan, H. and J. Groves, S. M. Macvicar, W. F. Marshall, W. S. Millar, R. Lloyd Praeger, W. H. Purchas, E. S. Salmon, and Prof. Wettstein. I have been assisted so largely by Prof. Wettstein that I can hardly sufficiently express my thanks and indebtedness to him. He has seen most if not all doubtful plants, and given me his opinion on them. He has given me full permission to make copies of the schemes and drawings of leaves, bracts, &c. in his Monograph, a permission which I have taken full advantage of. His diagnoses of species are so excellent that I have mostly adopted them.

DESCRIPTION OF SPECIES.

EUPHRASIA, Linn. Gen. n. 741 pro parte.—Wettstein, Monog. p. 9 (1896).—Benth. et Hook. Gen. Pl. vol. ii. pars ii. p. 976 (1876).

SECTIO I. *Eueuphrasia* Wetts. Mon. p. 68. Folia indivisa, dentibus utrinque acutis vel obtusis 1–10. Antheræ pilosæ.—Species Europæ, insularum Azoricarum, Asiæ extratropicæ, Americæ septentrionalis, Australiæ et Novæ Zelandiæ.

SUBSECTIO I. *Semicalcaratæ* Benth. in DC. Prodrom. x. p. 552 (1846). Wettst. Mon. p. 68. Species hemisphærii borealis, semper annuæ, antheræ mucronatæ, duorum staminum posticorum breviorum loculus alter semper longius calcaratus.

§ 1. PARVIFLORÆ Wettst. Mon. p. 69. Foliorum longitudo latitudinem in maximo duplo superans. Capsulæ margine semper erecto ciliatæ. Corollæ tubus fine anthesis non elongatus, itaque corollæ omnes longitudine æquali.

1. EUPHRASIA STRICTA*

Host, Flor. Aust. ii. p. 185 (1831).—Wettst. Mon. p. 93.

Caulis erectus, rarius simplex, plerumque *in parte inferiore* ramosus, 5–75 cm altus, rubescens vel fuscescens, pilis crispis reversis eglandulosis pubescens, in parte inferiore foliis mox deciduis tempore anthesis denudatus, ramis non numerosis ascendentibus suboppositis, folia caulina infima opposita cuneata, obtusiuscula utrinque dentibus 1–2 obtusis, media et superiora opposita ovata vel ovato-lanceolata in parte media latissima *longitudine latitudinem duplo superante, acuta, utrinque dentibus aristatis 3–5.* Bracteæ alternantes, latitudine folia caulina superantes, in triente inferiore latissimæ, *ovatæ, basi breviter cuneatæ, acutissimæ, dentibus longe*

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* I enter here the description of this species, though I cannot ascertain that it is a native of Great Britain. It is given by Prof. Wettstein, as on my authority, as occurring in "Surrey: Downs (lg.? H. Townsend,") Mon. p. 103; but I have never collected specimens in England nor have I seen native ones. I have had correspondence with the Professor on the subject, but he is unable to tell me how the error crept in.

aristatis vel acutis utrinque 4–7. Folia omnia viridia, in speciminibus siccis interdum nigricantia subtus plana nitida vel in speciminibus locorum aridorum plicato-striata, *glaberrima*, rarius in pagina superiore et in margine pilis brevissimis aspera. Spica *initio condensata mox valde elongata*, fructifera sæpe in parte inferiore calyces fructiferos solum gerens. Flores subsessiles. Calyx *glaber vel setulis minutis obsitus*, fructifer *non accretus.* Corolla 6–10 mm. longa, labio superiore bilobo, lobis denticulatis, rarius bilobis, labio inferiore trilobo, lobis emarginatis. Corolla plerumque pallide violacea, macula flava in labio inferiore et striis cæruleis vel purpureis notata, rarius cærulea vel albida. Capsula cuneato-obovata, angusta, truncata vel subemarginata, *calycis dentes non superans, margine longe ciliata* cæterum pilosa vel glabrata.

Syn. *E. officinalis* B. *montana β cucullata* Fries Novit. Flor. Novit. Flor. Suec. ed. 2, p. 198 (1828) ex parte. — *E. nemorosa* B. *intermedia*, *a. vulgaris* et *β alpestris* Soyer Willemet sur l'*Euphrasie offic.* et les espèces vois. p. 28 (Mém. d. l. soc. roy. d. sc. de Nancy, 1833–34).—*E. officinalis* Hayne, Arzneigew. ix. t. 8 (1823).—*E. officinalis β.* resp. b. *nemorosa* Koch Synop. Flor. Germ. et Helv. ed. i. p. 545 (1837).—*E. officinalis δ. nemorosa* Reich. Icon. Fl. Germ. et Helv. xx. p. 58 (1862).—*E. ericetorum* Jord. in Reut. Compt. rend. d. l. soc. Haller. 1854–56.—*E. condensata* Jord. Pug. plant. nov. p. 135.—*E. stricta* A. Kerner, Schedæ ad Fl. exsicc. Aust.-Hung. i. p. 41 (1881).

Exsicc. Kern. Fl. exsicc. Austro-Hung. No. 147.—Schultz, Herb. norm. nov. ser. Cent. i. No. 113 (as *E. ericetorum*).—Billot, Flor. Gall. et Germ. Excurs. No. 62 (as *E. nemorosa*).

Tab. 374. Tab. 378, fig. 135–146. Hayne, Arzneigew. ix. tab. 8 (1823).—Reich. Icon. Flor. Germ. et Helv. xx. tab. mdccxxxi. —Wettst. Mon. Taf. iii, fig. 135–146, Taf. vii, fig. 5, 6.

Fl. June–Oct.

Distribution. Mid Europe; Spain; France; Belgium; Switzerland; Germany; South Sweden and Norway; Austria; Upper Italy; Northern Balkan peninsula; West and South Russia. Not ascending into the alpine region.

The distribution of *E. stricta* in Europe would lead us to expect its occurrence in Great Britain though it has not yet been detected. It is a variable species and many varieties have been described and named by various botanists. Prof. Wettstein observes that in damp and cool localities the plant is smaller, has broader flatter and more shortly toothed leaves, is more branched; that in drier localities the plant is taller, sometimes less and sometimes more branched, and usually the leaves are narrower, plicate beneath and with more aristate teeth. From *E. brevipila* it may be distinguished by the absence of glandular hairs; from *E. Salisburgensis* by its capsule being furnished with long erect hairs; from *E. nemorosa* by the more aristate character of the teeth of the leaves and bracts, its less branched stem, its entire or subemarginate capsule, exceeded by the calyx teeth and by its suberect and straight (not subarcuate or recurved) bracts.

Three names which have been applied to this species require special notice, viz. *E. stricta* Host, *E. ericetorum* Jord., and *E. nemorosa* H. Mart. Jordan's name *ericetorum*, which is undoubtedly Host's *E. stricta*, must give way on account of the priority of the latter. *E. nemorosa* Host is described as a species further on.

Prof. Wettstein's opinion that a parallel earlier flowering form to *E. stricta*, having the same relation to it as *E. montana* to *E. Rostkoviana*, exists, has been confirmed by the observations of Dr. S. Murbeck, and he has named the plant *E. Suecica* Murb. et Wettst.

2. EUPHRASIA BOREALIS

Wettst. Mon. p. 108.—*E. Rostkoviana* v. *borealis* Towns. Lond. Cat. ed. 9.

Caulis crassus, erectus, 5–20 cm, pilis albidis crispulis reversis pubescens, simplex, vel infra medium ramosus, ramis erecto-patentibus rarius iterum ramosis. Folia infima opposita cuneato-obovata vel elliptica, obtusa, utrinque dentibus 1–2 obtusis, folia media et superiora subopposita vel alternantia, obtusa, ovata, dentibus utrinque 3–5 obtusis, vel dentibus infimis acutiusculis. Bracteæ alternantes vel suboppositæ, late ovatæ utrinque 3–5-dentatæ, dentibus acutis vel breviter aristatis. Folia et bracteæ nonnunquam fere orbicularia et tunc dentibus obtusis et glabrescentia. Folia omnia erecto-patentia, nitida, subtus striata, in speciminibus siccatis frequenter griseo-viridia, subglabra, plerumque in pagina superiore in margine et in pagina inferiore in nervis setis albidis strictis hirsuta, vel tota setosa. Spica initio condensata non valde elongata. Flores subsessiles. Calyx dentibus triangulari-lanceolatis acuminatis subaristatis, indumento ei foliorum simili, fructifer modice vel valde accretus, dentibus triangularibus subpatentibus. Corolla 6–8 mm longa, labio superiore bilobo lobis reflexis emarginatis vel denticulatis, labio inferiore trilobo lobis emarginatis. Corolla plus minusve striis violaceis notata et macula flava in labio inferiore et in fauce picta, alba vel labio inferiore alba et labio superiore pallide violacea vel tota violacea. Capsula elliptica aut oblonga basis versus paulum attenuata, truncata, emarginata, calycem æquans, margine ciliata cæterum glabriuscula.

SYN. *E. Rostkoviana* v. *borealis* Towns. Lond. Cat. ed. 9.

Tab. 374. Tab. 378, fig. 147–153. Wettst. Mon. Taf. iii. fig. 147–153, Taf. xi. fig. 7.

FL. June–Aug.

DISTRIB. England; Scotland; Ireland; Faroe Islands, "Oestero" bei Eide; *Simmons* (comm. Wettst.), Suderoe Gratzl; *Prof. A. Kerner* (Wettst. Mon.).

DISTRIB. IN ENGLAND AND WALES: CUMBERLAND, Borrowdale (1884). HANTS, near Herne (1895); *E. F. Linton.* Freshwater, Isle of Wight (1883). HEREFORD, near Downton on the rock (1853); *W. H. Purchas.* WARWICK, Whichford and Long Compton. WESTMORELAND, Ulleswater (1886); *C. Bailey.*

DISTRIB. IN SCOTLAND: ABERDEEN, Braemar (1890). ARGYLE, Oban (1881). Shiel Bridge (1896), CAITHNESS, W. Leastne; *Klay.* INVERNESS, Foyers (1881). Inverailort (1896). Eilean Shona (1896). SHETLAND, Sutton Voe; North Voe; Sand Voe; Northmaven (1891); Shetland mainland (1887); *W. H. Beeby*. SUTHERLAND, Banks of Naver nr. Bettyhill (1889); *W. F. Marshall*.

DISTRIB. IN IRELAND, GALWAY, Connemara (1853); *F. Kirk*. MEATH, Laytown (1896); *R. Lloyd Praeger*.

Pascual. This species is found in short uncultivated grass pastures, especially on the coast of Scotland, but it occurs also far inland, ascending over 1000 ft.

See remarks under *E. brevipila* as to the borders of the areas of this and *E. borealis* meeting in the British Isles.

Since this Monograph was completed Prof. Wettstein has written to me respecting the varied forms of *E. borealis* and *E. brevipila* of which I communicated a series of specimens. I had doubts whether many glabrous forms which have been referred to *E. borealis* should not be looked upon as glabrous forms of *E. brevipila*, or that there are glandular forms of *E. borealis* and that we have only one species, which was originally my opinion some years ago. Prof. Wettstein writes that he has never as yet seen an eglandular form of *E. brevipila* and this fact mainly disposes him to believe that we have two species and that hybrids occur between them. For the present I assume that Professor Wettstein is correct and that we have two distinct species, and that hybrids do occur between them, but I am convinced that forms which have been referred to *E. borealis* do represent *an eglandular form of E. brevipila*, which is not unfrequent in Scotland. Future observation may possibly determine that *E. borealis* is an eglandular form of *E. brevipila* which has a separate area, and a more northern extension than the parent form, and that this eglandular form is constant within this area except on its southern border.

3. EUPHRASIA BREVIPILA

Burnat et Gremli, ex Towns. in *Journ. Bot.* 1884, p. 167.—Wettst. Mon. p. 109.

Caulis erectus, rarius simplex, plerumque infra medium ramosus, 5–35 cm altus rubescens vel fucescens, pilis crispis reversis eglandulosis pubescens, in parte inferiore foliis mox deciduis tempore anthesis denudatus, ramis erectis vel erecto-patentibus suboppositis rarius iterum ramosis. Folia caulina infima opposita, cuneata, obtusiuscula utrinque dentibus 1–3 obtusis, media et superiora subopposita, ovata vel ovato-lanceolata, circiter in parte media latissima longitudine *latitudinem duplo superante, acuta, utrinque dentibus aristatis 3–5*. Bracteæ alternantes vel suboppositæ, latitudine folia caulina superantes, eis breviores, in triente inferiore latissimæ, *ovatæ, basi breviter cuneatæ, dentibus aristatis vel acuminatis, utrinque* 4–7. Folia omnia viridia, in speciminibus siccatis plerumque griseo-viridia, subtus plana nitida vel plicato-striata, in pagina superiore et inferiore *pilis glanduliferis brevibus rectis, imprimis in nervis et in margine*, saltem basin versus, obsita; cæterum glabra vel setis strictis plus minusve densis obsita. Spica initio condensata, mox valde elongata; flores subsessiles. Calyx *indumento ei foliorum simili*, fructifer non vel modice accretus. Corolla 6–10 mm longa, labio superiore bilobo, lobis *denticulatis, rarius*

bilobis, labio inferiore trilobo, lobis emarginatis. Corolla pallide violacea vel cærulea vel alba,macula flava in labio inferiore et striis cæruleis et purpureis notata. Capsula cuneato-obovata, angusta, truncata vel subemarginata, *calycem æquans vel superans margine longe ciliata*, cæterum pilosa vel glabra.

Some of our native plants differ considerably from the continental ones. Prof. Wettstein's description, which I give, is admirable for the latter so I have not altered it, but I would note the following differences in some of the English plants:—

Folia caulina . . . ovata vel ovato-oblonga . . . longitudine latitudinem non multo superante, obtusa utrinque dentibus obtusis 3–5 vel dentibus superioribus acutis. . . . Bracteæ . . . . latitudine folia caulina paulo superantes . . . , ovatæ, superiores basi breviter cuneatæ, dentibus cuspidatis vel breviter aristatis . . . . folia omnia subpatentes vel arcuato-recurvæ . . . Corolla . . . labio superiore bilobo, lobis emarginatis. . . . Corolla pallide violacea vel albida vel labio superiore pallide violacea et labio inferiore alba, striis purpureis notata, mucula lutea in labio inferiore, fauce luteo.

I have drawn figures of some of the leaves and bracts of a form which is frequent in Scotland. Forms are also frequent in which the lower leaves are longer in proportion to their width than those I have figured, so as to merit the term *ovate-oblong*, but I have never seen specimens to which *ovate-lanceolate* would be applicable. The teeth of the leaves and bracts of the continental form are much narrower and with much longer aristæ.

Syn. *E. officinalis* B. *montana* E. Fries Novit. fl. Suec. Ed. ii. p. 198 (1828) ex parte.—*E. officinalis* var. *montana* Fries Summa veg. Scand. I. p. 19 (1846).—*E. officinalis* A *Platyphyllæ* γ. *montana* Reich. Icon. Flor. Germ. et Helv. xx. p. 58 (1862). — *E. parviflora* Wettst. in Engler u. Prantl Nat. Pflanzenfam. iv. T. Abt. 3 b. S. 101 (1893). — *E. brevipila* Wettst. in Oesterr. bot. Zeitschr. (1894), S. 92.

Exsicc. Fries Herb. norm. ix. n. 17.

Tab. 374. Tab. 378, fig. 154–162, 163, 164, 165. Reich. Icon. Germ. et Helv. xx. tab. mddxxxiii. fig. I. et fig. 1 et 2.—Taf. iv. fig. 154–161, Taf. vii. fig. 8 (Wettst. Mon.).

Fl. June–August.

Distribution.—1. Alpes Maritimes to Carinthia; Switzerland, Apeninnes; 2. Galiçia; Bukowina; N. Hungary; Carpathians; East and West Prussia; West Russia; Finland; Sweden; Norway; Denmark; Great Britain; Ireland.

Distrib. in England and Wales: Hants, Ventnor, Isle of Wight (1879). Warwick, Honington (1896–7).

Distrib. in Scotland: Aberdeen, Braemar (1890). Argyle, Oban (1881); Shiel Bridge (1896); near Corran (1896); Benderloch, Oban (1885); *C. Bailey* (J. Britten). Trossachs, K. Richter; H. Richter (Wettst. Mon.). Tigh-na-Bruach (1884); *W. Matthews.* Caithness, abundant and with very large flowers in pastures by the main road west of Thursoe (1897). Inverness, Foyers (1881); Ness Side (1892); Inverailort (1896). Kincraig (1891); *A. Somerville* (J. Britten). Perth, Ben Lui (1881); *G. Nicholson.* Ross,

Kinloch Ewe; *E. S. Salmon.* Poolewe, 1897, where the eglandular form occurs in abundance. SUTHERLAND, Durness (1881); *W. F. Marshall.* Bettyhill (1897).

DISTRIB. IN IRELAND: CAVAN, Mount Nugent (1896); *R. L. Praeger.* GALWAY, Clonbrock (1896); *R. L. Praeger.* Roundstone (1852); *D. Oliver.* LOUTH, Togher (1896); Lurgan Green (1896); *R. L. Praeger.* MEATH, Laytown (1896); *R. L. Praeger.* KILDARE, Kilcock; Carbury; Leixlip; (1896); *R. L. Praeger.* KINGS COUNTY, Edenberry (1896); *R. Lloyd Praeger.* TYRONE, Mullaghearn; Omagh (1896); *M. C. Knowles.*

The plant referred to by Prof. Wettstein in Mon. p. 112—"England: Buxton (Townsend; H. Fr.)" was determined by him from specimens not fully developed of my *E. Rostkoviana* v. *tenuis*, and he now thinks the plant may be referred to *E. campestris* Jord. provided the area of this species is found to extend so far, but he is uncertain what position and rank should be assigned to Jordan's *E. campestris.* See remarks in Wettst. Mon. pp. 194 and 112.

E. brevipila may be distinguished from *E. stricta* by the presence of shortly stalked glands, and by the same from *E. Rostkoviana* in which the glandular hairs are long, wavy or curled, and many-celled. See remarks under *E. borealis.*

The glandular hairs are sometimes found only at the base of the bracts and calyx.

This species, which is pascual and is found in abundance in the long herbage of cultivated pastures especially on the west coast of Scotland, also ascending like *E. borealis* to an altitude of 1000 ft. inland, will probably be found to occur throughout Britain. It is certainly one of the most generally distributed species in Scotland. The borders of *E. brevipila* and *E. borealis* meet in Scotland. In some localities, later flowering and dwarf plants occur which are nearly or quite eglandular, and if *E. borealis* be distinct some of these are probably hybrids between *E. brevipila* and *E. borealis* (see under hybrids at the end of this Monograph), but some forms must be looked upon as eglandular *E. brevipila;* this form occurs abundantly in the neighbourhood of Poolewe in Ross-shire, the upper leaves are broadly ovate with acute teeth, the teeth of the bracts acuminate, hardly awned but cuspidate, leaves bracts and calyx shining and very sparsely setose, calyx-teeth lanceolate, acuminate, about equalling or slightly exceeding the capsule which is rounded at the end and slightly emarginate, the margins fringed; whole plant pale green, flowers white or purple, but mostly white. Profusely glandular plants occur in the same locality. *E. brevipila* being pascual has the main stem frequently bitten, in an early stage, by sheep, it then develops numerous and often compound branches which are short, often equal in height and bear smaller flowers than the normal form.

A very remarkable plant has been found by Mr. Beeby in wet places about Ollaberry, Northmaven, Shetland. It is tall, unbranched, with large leaves and bracts and large included flowers and it is eglandular. Prof. Wettstein considers it very luxuriant *E. borealis.*

4. Euphrasia nemorosa

H. de Martius, Prodr. Floræ Mosquensis, p. 107 (1817).—Persoon, Synopsis plant, seu enchirid. ii. p. 149 (1807) pro var.—Wettst. Mon. p. 118.

Caulis erectus crassus rarissime simplex, plerumque in parte inferiore usque ad medium caulis vel solum in media parte *ramosus*, 5–40 cm altus, rubescens vel rufescens, pilis crispulis reversis eglandulosis pubescens hinc inde glabrescens vel bifariam pubescens, in parte inferiore foliis deciduis mox denudatus, ramis erectis, *sæpe iterum ramosis*, oppositis. Folia infima obtusa, utrinque dentibus 1–3 obtusis, media et superiora ovata vel ovato-lanceolata opposita acuta, medio fere latissima, utrinque dentibus acutis, sed *non aristatis* 4–7. Bracteæ suboppositæ latitudine folia caulina superantes, sed breviores, basin versus latissimæ, utrinque dentibus 4–6 acutissimis vel breviter aristatis, *patentes vel subarcuato-recurvæ*. Folia omnia viridia, *glaberrima* in speciminibus siccatis griseoviridia, *non nitida, subtus plicata*. Spica initio condensata, mox elongata. Flores subsessiles. Calyx glaber, fructifer subinflatus, dentibus brevibus. Corolla cca. *5 mm longa*, labio superiore bilobo, lobis minute denticulatis, labio inferiore trilobo, lobis emarginatis, extus hirsuta, albida, labio superiore cæruleo picta et macula lutea striisque cæruleis in labio inferiore vel tota plus minus cærulea. Capsula cuneato-obovata, matura *calycem æquans* vel sæpius *superans*, emarginata, margine longe ciliata, ceterum pilosa vel glabra.

Syn. *E. officinalis* v. *parviflora* Reich. Fl. Germ. exurs. n. 2444 (1830) 32). ?—*E. officinalis* δ *alpestris*, No. 3, Koch, Synop. Flor. Germ. et Helv. ed. i. p. 545 (1837).—*E. tetraquetra* Arrond. in Bull. soc. polym. 1862, p. 96.—Hist. nat. d. Morbihan. Bot. p. 76 (1867).—Grenier, Flor. Jur. p. 568 (1865).—*E. nemorosa* Gremli, Neue Beit. z. Fl. d. Schw. I. S. 18 (1880).—*E. officinalis* v. *tetraquetra* Breb. Flor. Norm. ed. 2, p. 183, sec. Grenier, *l.c.*

Exsicc. Billot, Flor. exs. no. 2724$^{\text{ter}}$ (as *E. ericetorum*). Reich. Exs. no. 243 (as *E. officinalis*).

Tab. 375. Tab. 378, fig. 169–177. Bull. Herb. d. l. Fr. tab. 233.—? Lam. iii. d. genre, pl. 518. Fig. 2 (bad).—Sowerby, Eng. bot. 3rd Ed. vol. vi. tab. dccccxci. fig. sinistra ?—Wettst. Mon. Taf. iv. fig. 169–177, Taf. viii. fig. 1.

Fl. August–October.

Distrib. Mid, North, and East France; Belgium; Switzerland; South-west Germany; Northern Bohemia; Denmark; Norway; Sweden ?; England; Scotland; Ireland; Channel Islands.

Distrib. in England and Wales: Berks, Newbury (1846); *A. B. Jackson.* Cornwall, Helston (1883); *J. Cunnack.* Downderry (1885); *W. S. Millar.* Near Ashridge Wood; A. B. Jackson (1896). Cumberland, Rosthwaite (1884). Derby, Matlock (1881); *H. J. Groves.* Near Buxton (1884). Devon, Post Bridge, Dartmoor (1885); *W. F. Marshall.* Dorset, Ranston (inclining to *E. curta*, 1892). Portland (Groves; H. Fl.); *Wettst. Mon.* *Hants, Fresh-

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* *E. nemorosa* is the prevalent species in Hants, not *E. ericetorum* (= *E. stricta*) as stated in 'Flora of Hampshire,' 1883.

water, Isle of Wight, 1883. Shedfield (1872). Sidmonton (1896); ?. LANCASTER, Liverpool (1883); ?. NORFOLK, Fladen Fen (1886); *Ar. Bennett.* NORTHAMPTON, Pipewell (1885). RADNOR, Llanwrtyd (1891); *W. H. Purchas.* SOMERSET, Conglebury (1884); *J. W. White.* Between Cheddar and Shipton (1892); *W. S. Millar.* STAFFORD, Ecton Hill, on limestone (1892); *W. H. Purchas.* Biddulph (1885); *W. H. Painter* (J. Britten). SURREY, Vachery Pond (1884); *W. H. Beeby.* Boxhill (1825); Dorking (1829); *J. Woods Herb.* Wokingham (lg. ?; H. Fl.) *Wettst. Mon.* London (Caruel; H. Fl.) *Wettst. Mon.* SUSSEX, Storrington (1853); Graffam Common; *J. Woods Herb.* WARWICK, Honington (1885). Honington (1886 "ad curtam vergens" Wettst. in litt.) YORK, York (Nicholson; H. Haus.) *Wettst. Mon.* Bramham Rocks near Ripon (1880); *G. Nicholson.* Micklefield (1877); ?.

DISTRIB. IN SCOTLAND: ABERDEEN, "Braemar (Townsend; H. Sch.)" (1890) *Wettst. Mon.* SHETLAND, Grasswater (1890); *W. H. Beeby.*

DISTRIB. IN IRELAND: MAYO (lg. ?; H. Fl.); *Wettst. Mon.* MEATH, v. *tetraquetra*, Oldcastle; *W. S. Millar.* WEST MEATH, Lac Lean [Lough Lene ?] Thielens; H. Lans.); *Wettst. Mon.*

CHANNEL ISLANDS. Guernsey, near Doyle's column (1892); *W. S. Millar.*

This is probably the most generally distributed species in England in grass pastures, on grassy banks &c.

From *E. stricta E. nemorosa* may be known by its smaller flowers, by the less aristate teeth of the bracts, more branched stem, emarginate capsule, glabrous calyx, and patent or outwardly curved bracts. From *E. gracilis* by its stouter and less branched stem, larger, not shining bracts which are plicate beneath when dry. From *E. curta* by its glabrous leaves bracts and calyx.

Slender forms of *E. nemorosa* are sometimes difficult to distinguish from *E. gracilis*, the more abrupt termination of the spike besides the dead, not shining, and plicate bracts of the former will assist in determination.

Forms which are decidedly intermediate between *E. nemorosa* and *E. curta* occur (see Prof. Wettstein's remarks in Mon. p. 133), which Prof. Wettstein calls *E. curta* var. *glabrescens.* He considers the distinctly geographical and morphological separation of *E. curta* and *E. nemorosa* a proof of the distinction of these two as species.

Prof. Wettstein expresses it as his opinion, that though Henricus de Martius (*Prodr. Floræ Mosquensis*, p. 107, 1817) first used Persoon's varietal name *nemorosa* as designating a species, his *nemorosa* was not exclusively, if at all, Persoon's plant. Persoon's description of *E. officinalis* v. β *nemorosa* in *Synopsis Plantarum*, p. 149 (1807) agrees perfectly with our plant and so does Bulliard's figure "Bulliard Herb. d. l. Fr. tab. 233," quoted by Persoon. But in later years Persoon applied his name "*nemorosa*" to specimens, in his Herb., of *E. stricta* Host, the characters of which do not at all agree with those given for his *nemorosa* in 1807. Why the Prof. throws this doubt on H. de Martius' "*nemorosa*" and gives priority to Persoon I do not see, as De Martius' description, *l.c.*, runs thus:

"2. *E. nemorosa :* [*sylvestris*] caule elongato ramosissimo, foliis glabris subnitidis ovatis argute serratis. *Bull.* herb. t. 233 (in sylvis, nemoribus, pratisque Jun. Aug.)." So that his description agrees and he quotes Bulliard herb. t. 233. The date of the 1st ed. of *Fl. Mosq.* is 1812, but only two copies exist, the rest having been destroyed by fire.

(To be continued.)

NOTE ON RANUNCULUS AURICOMUS L.

By W. P. Winter.

While making some observations on the frequency of the reduction in the number of petals in *Ranunculus auricomus*, the following facts came under my notice.

During this spring altogether 308 specimens were examined from seven localities near Cheltenham. These could obviously be arranged in two groups, for 204 of them, coming from three localities, had no petals, but their sepals were strongly arched, green near the centre line and yellow near the edges. The remaining 104, from four other and different districts, gave the results following:—

A. The sepals were frequently fringed, becoming at the same time less hairy at the back and much more petaloid, while the edges were quite wavy. This fringe was frequently developed on one side only, and was usually of such a character and in such a position as to replace the petals which were absent.

B. The petals, when present, exhibited all gradations between large glossy laminæ, having a small pit as a nectary much as in *Ranunculus sceleratus*, and yellow tubular bodies with the nectary enclosed in the base. The margins of the pitted nectary appeared to retain the power of intercalary growth, sometimes becoming extended on one side only, while in some instances the ventral margin also grew out, so forming complete tubes. In only one case was a double nectary found.

C. The fringing of the sepals was correlated with the modification or abortion of the petals. For the purpose of examination the 104 specimens were separated into group A with three or more sepals fringed, and group B with two or less sepals fringed.

In group A 79 specimens occurred. These would normally have 395 sepals and 395 petals. 304 sepals were distinctly fringed, while of the petals 263 were absent, 84 distinctly tubular, and only 48 normal and complete.

In group B were 25 specimens. These would normally have 125 sepals and 125 petals. Of the sepals 43 were fringed, while of the petals 60 were absent, 23 tubular, and 42 complete.

Or taking percentages:—

In group A 77 per cent. of the sepals were fringed, and 90 per cent. of the petals were aborted.

In group B 34 per cent. of the sepals fringed gave only 66 per cent. of petals aborted.

Would not these facts additionally conduce to prove that in plants where the petals have aborted the sepals begin to adopt their functions? Are we not also furnished in this instance with a further link between *Helleborus* with its sepals and tubular nectaries and *Anemone* with its petaloid sepals and absence even of petal-replacing nectaries.

I may add that the specimens were carefully gathered indiscriminately, so that they furnish a fair average. The fringes were quite distinct, and great care was taken to avoid mistaking modified stamens for modified petals, although the former also occurred.

HIERACIUM OGWENI, SP. NOV.

By E. F. Linton, M.A.

In 1890 occurred by the side of the R. Ogwen, near Tregarth, Carnarvonshire, a hawkweed which I took at first for a form of *Hieracium gothicum* Fr. or *H. sparsifolium* Lindeb., but which proved on cultivation to have as great or greater affinity with *H. umbellatum* Linn. Judging from a specimen of the same plant gathered at Bethesda, higher up the same valley, by the Rev. A. Ley, Dr. Elfstrand and Mr. F. J. Hanbury were disposed to place it as a variety under this species. The new form has no doubt a tendency to fasciculation in the upper branches, approaching *H. umbellatum* in this respect; but it differs so markedly in some other points, that I cannot place it on the same level with other *H. umbellatum* varieties; though it may perhaps rank as a subspecies. Mr. Dahlstedt, to whom I sent specimens labelled "*H. umbellatum* var.," observed that it reminded him very strongly of *H. reticulatum* Lindeb., adding that it might perhaps be considered as a connecting form between these two species. The following is the description, the name being taken from the river of the valley where it has been detected:—

H. Ogweni, n. sp. Stem 2–3 ft., erect, somewhat hairy below, glabrous above, leafy. Leaves lanceolate, spreading, distantly toothed, rather scattered, light green, thinly hairy below, gradually narrowed to the base or in the lower leaves to the petiole, upper leaves rounded but narrow. Heads rather small, many in a corymbose panicle, often subumbellate; peduncles shortly pubescent and floccose; involucre light green, not blackening (scarcely darkening at all when carefully dried), nearly glabrous, sprinkled with few small glands; bracts straight, appressed, obtuse, a few of the outermost a little lax, tips straight. Styles yellow. Pappus pale brownish.

H. umbellatum L., variable as the species is, differs from *H. Ogweni* in having the lower leaves sessile or scarcely petioled and all the leaves of a dark green and more numerous and crowded, the panicle more distinctly umbellate, the involucre eglandular, dark green, turning blackish or blackish green when dry, the outer and middle bracts recurving or at least spreading even in bud, a very distinctive feature of the species. *H. Ogweni* has since its introduction into my garden propagated itself freely, and needed checking; of *H. umbellatum* I have seen but a single seedling, though two plants of it have been flowering and fruiting with me for some years.

NOTE ON BONNEMAISONIA HAMIFERA Har.

By E. M. Holmes, F.L.S.

This remarkable plant was first detected in this country by Mr. T. H. Buffham, who, in August, 1893, found three specimens floating in the sea at Falmouth. The plant was only known previously as a native of Japan, and has hitherto been found nowhere between that country and Great Britain. In May, 1896, my friend Mr. E. George found it growing attached to other algæ at low water at Shanklin, in the Isle of Wight, and in August of the same year I found it thrown up at the same place in some quantity, but with the hooked branches only sparingly developed, whereas in those found by Mr. George in May they were abundant. During a visit to Falmouth in June, 1897, with my friend Mr. George, I found about 120 specimens, and my friend about twenty-five, during a fortnight. Some of these were attached to *Cystoseira granulata*, *Ceramium*, and *Corallina*, in deep pools at low tide, over a range of about eight miles; but the majority of the specimens were floated in, showing that it is a deep-water species under ordinary conditions. It so nearly resembles *Dasya coccinea* in colour and in the rigidity of the ramuli that it might easily be passed over as that plant. It is not likely, however, that it could have been passed over by any one who mounted a specimen, and no specimens of it occur in collections made by Falmouth algologists during the last fifty years, so far as can be ascertained. It is only possible to conceive, therefore, that pieces must have become detached from Japanese ships arriving in this country, and having found suitable conditions of temperature, and having attached themselves by the hooked branches to other plants, have become naturalized in this country. These branches gradually thicken, and so grasp firmly any object to which they are attached.

There is one other alga, *Nitophyllum venulosum* Zan., the presence of which in this country can, I think, only be regarded as arising from the same cause. It is an Adriatic species, not recorded, so far as I am aware, anywhere between that sea and Plymouth, where it has been collected during the last fifty years by various algologists, but was mistaken for *Rhodophyllis bifida* until I pointed out in *Grevillea*, ii. 2 (July, 1873), that the plant was a *Nitophyllum*, having tripartite instead of zonate tetraspores. This plant is not known to occur elsewhere in Britain, and there seems to be no other explanation of its occurrence possible than that it must have been carried on a ship's bottom and become naturalized. It is true that *Gigartina Teedii* is only found at Brixham in Great Britain, but it occurs also in Jersey, and apparently reaches its northern limit in Torbay.

SHORT NOTES.

Scrophularia Scorodonia in Cornwall.—On a recent visit to Fowey I found this plant growing abundantly on the stony slope of the harbour close to the railway station. I had previously seen the plant on the hills behind Towan Head at Newquay, but had never met with it on the south coast of Cornwall, except at Penzance, and believe the locality of Fowey is not recorded for it. The next northerly point known to me for the plant is near Kingsbridge, in Devon, where the late Rev. W. S. Hore told me he had discovered it many years ago. Fortunately the Fowey locality is one where the plant will not easily be destroyed, since it is almost impossible to get the root from between the stones, and the plant grows luxuriantly as if quite at home there.—E. M. Holmes.

Sagina Reuteri Boiss. in Herefordshire.—I met with this plant, growing plentifully, upon the garden walks of the Rectory, at Tedstone Delamere, on July 22nd. Its previously recorded stations are,—the platform of Great Malvern railway-station, where I first gathered it on July 8th, 1889 (see *Journ. Bot.* 1894, pp. 181–2); and the platform of Foregate Street (Worcester) railway-station (*Journ. Bot.* 1896, p. 367), where it was noticed in 1896. Mr. G. Claridge Druce, who contributed the first article referred to, has kindly looked at the Tedstone plants, and compared them with a Malvern specimen, and agrees with me in considering them identical. Until meeting with the Tedstone examples, I had concluded that the plant had been introduced with the ballast forming the platforms of the two stations, which are situated on the same line of railway; but its occurrence at Tedstone Delamere, which is four miles distant from any railway, and about twelve miles from the nearest point where it had hitherto been gathered, leads me to hope that it may be a native, and to this view, I may add, Mr. Druce has all along been inclined. The Tedstone plants are more robust than those from Worcestershire, and this would naturally follow from growing on open walks instead of between brickwork. I have sent specimens to the British Museum Herbarium.—Richard F. Towndrow.

Fossombronia cristata Lindb. in Ireland.—This hepatic, which does not appear to have been recorded from Ireland, was found by me in October, 1890, growing abundantly on the shore of Lough Bridan, Co. Down, and was mentioned in a paper I read shortly afterwards before the Belfast Naturalists' Field Club, which, however, was not published in their *Proceedings*. The habitat was a bed or flat bank of a whitish stiff clay, which is usually covered by water, but had that season been dry for several months. The tufts were from half an inch to two inches in diameter, in the form of little rosettes of a vivid green colour. The individual plants were densely tufted and taller than *F. pusilla*, which abounds in a wet autumn in all the clover fields in the neighbourhood. The spores are covered with high ridges or crests. Mr. Pearson, to whom at the time I sent fresh specimens, said it was not *F. cæspitiformis*, which I had named it, but *F. cristata* Lindb. I was hoping to have gathered further specimens, but not once during the last seven years has the level of the water subsided sufficiently to expose the clay bank, and there is no other suitable habitat at the locality.—H. W. Lett.

Rubi of Streatham and Tooting Commons. — Spending the closing days of last August at Streatham, I was able to examine the very numerous bramble-thickets on Streatham and Tooting Commons pretty thoroughly. As these commons are so near London, and most of the brambles on them are particularly well marked and abundant, I have some hope that my lists may be of exceptional interest. They are not, however, so nearly exhaustive as they might have been had the season been less advanced. Streatham Common:—*R. idæus* Linn., *R. carpinifolius* Wh. & N., *R. Lindleianus* Lees, *R. erythrinus* Genev., forma *glandulosa*, *R. rhamnifolius* Wh. & N. (our usual form, the *R. cardiophyllus* Lefv. & Muell.), *R. pulcherrimus* Neum., *R. rusticanus* Merc., *R. pubescens* Weihe (sp. coll.) and its var. *subinermis* Rogers, *R. leucostachys* Schleich., *R. radula* Weihe var. *echinatoides* Rogers, *R. adornatus* P. J. Muell., *R. dumetorum* Wh. & N. (a form or forms intermediate between vars. *diversifolius* Lindl. and *concinnus* Warren), *R. corylifolius* Sm. a. *sublustris* (Lees). Besides typical *R. pulcherrimus*, the highly glandular and aciculate form which we have been calling var. *setosus* (see *Journ. Bot.* 1891, 240; 1895, 48, 49) is locally abundant, and keeps (as usual) very distinct from the type. Of these fifteen strongly marked forms, the only ones that I did not see in great quantity are *idæus*, *Lindleianus*, *leucostachys*, and *sublustris*. Tooting Common:—All that are given above for Streatham Common except (apparently) the var. *setosus* of *pulcherrimus*; but here *R. Lindleianus* is exceedingly abundant, and *R. pulcherrimus*, *R. pubescens*, and *R. adornatus* far more so than on Streatham Common. There are also the following additional forms:—*R. integribasis* P. J. Muell., *R. affinis* Wh. & N., small typical *R. radula* Weihe, very distinct-looking small-leaved states of *R. carpinifolius* and *R. rhamnifolius*, and what seems a form of *R. mucronatus* Blox., with terminal leaflet less mucronate than usual, and a rather exceptionally hairy stem. Tooting Common is a very good place for studying most of the Rubi in these lists, as they grow there for the most part in separate thickets or clumps, with extraordinarily little intermixture of species. They were all known to me for Surrey before, except *R. integribasis*, typical *R. radula*, and the remarkable glandular form of *R. erythrinus*, which is identical with plants which I saw last year in West Kent,—at Sevenoaks and at Tunbridge Wells.—W. Moyle Rogers.

The Publication of Names in Exsiccata (see p. 306).—We were glad to notice that the Berlin people had adopted a modification of the second clause of Article 42 of the "Laws of Botanical Nomenclature," which relates to the publication of a name by means of "exsiccata." The clause in question has always seemed to us a particularly weak point in the "Laws," for the mere identical ticketing and distribution of a few specimens which may or may not belong to precisely the same plant is a most unsatisfactory and "slipshod" method of publication, and we think that it is incumbent on the author of a new species not merely to give it a name, but also to indicate to some extent its distinguishing characteristics. The Berlin modification of the rule whereby it is necessary, in order to constitute a valid publication, that the specimen should be accompanied by a description, is certainly a step in the right direction, but we should like to see the matter carried further, and publication by means of "exsiccata" entirely disallowed, for the following reasons:—(1) That the number of sets of exsiccata which can be issued is necessarily much more limited than the number of almost any printed book; (2) That exsiccata are inadmissible in libraries, and can only be consulted in a few of the large herbaria; (3) That experience teaches us that the specimens sent out under one number in a fasciculus are by no means always identical, though of course they always should be so, besides which there is always the liability of labels being crossed; (4) That the means of publishing descriptions of new species either in a journal, the proceedings of a society, or in a book, are within the reach of everyone.—H. & J. Groves.

Pyrola rotundifolia L. in Flintshire.—On the 25th August last my brother, Mr. Spencer Whitwell, of Liverpool, obtained a number of specimens of this species on a piece of boggy ground near Mostyn. This is its first record for Flint county: indeed, according to *Top. Bot.* ed. 2, no *Pyrola* has previously been reported for Wales itself. *Parnassia palustris* was abundant at the same spot. — William Whitwell.

NOTICES OF BOOKS.

Synopsis der Mitteleuropäischen Flora. By P. Ascherson and P. Graebner. Leipzig: W. Engelmann. 1897. (Band i. Lieferungen 3 and 4.)

In the review of the former parts of this work (*Journ. Bot.* 1896, 480), the importance of which for the student of the Central European flora, as well as of the European floras generally, can hardly be overstated, certain arrangements were hinted at which should guarantee its regular progress. The labour appeared too great for any single person, even of so ripe an experience as Prof. Ascherson, considering the thoroughness and completeness with which it needed to be done. Author and publisher seem to have felt this alike, and the cover of the third and fourth parts, which have been issued jointly on the 15th of June, announces that Dr. Paul Graebner, of Berlin, has consented to become co-author. He has already assisted Prof. Ascherson for a considerable time in his arduous task, and may be expected fully to justify the hopes of the author and the publisher, and not less of the large circle of students who are more immediately interested in the progress of the work. On the other hand, we trust that it will not lose that elaboration and learning which are characteristic of Ascherson's methods, though they may occasionally lead him away into the regions of irrational purism or over-erudition, and encumber his work by a profusion of details.

The present double part finishes the vascular cryptogams, and contains the *Gymnospermæ* and the first three orders of the Monocotyledons, viz. *Typhaceæ*, *Sparganiaceæ*, and a portion of the *Potamogetonaceæ*. Seventeen species and seven subspecies of *Coniferæ* are described as indigenous within the area of the *Synopsis*, and thirty-seven foreign species which are more or less frequently cultivated, while many more are mentioned in short notes. If introduced species are taken up at all, much cannot be said against this vast number of foreign *Coniferæ*, considering the important place they occupy in horticulture, and, in Germany at least, also in experimental forestry; but we are afraid this practice will, if consistently carried out through the whole work, swell its volume enormously, whilst the horticulturist and the forest officer will still have to consult their special books. *Gnetaceæ* are represented by three species and two subspecies; *Typhaceæ* by five indigenous species and one foreign species, which is likely to occur within the area of the *Synopsis;* and *Sparganiaceæ* by five species and three subspecies.

Space forbids us to discuss in detail the contents of these two parts. They are quite up to date, as shown by the reference to Ikeno's and Hirase's discovery of the spermatozoids of *Gingko* and *Cycas*, and the abundance of information, sometimes compressed into single paragraphs, and the accompanying foot-notes, is astonishing, if not at first bewildering.

The subdivisions of the species, such as subspecies, varieties, &c., is in some cases carried very far. One instance may suffice. *Juniperus communis* comprises (A) *Juniperus communis* proper and (B) *Juniperus communis nana*. The former is subdivided thus: A. I. *Weckii* (*a*,—proper), *b. oblonga* II. *a. elongata*, b. *vulgaris* (1,—proper) 2. *suecica*, 3. *hibernica*, 4. *pendula* (*a*,—proper) b. *latifolia*, c. *prostrata*, and the "lusus" *coronata* and *thyiocarpa*. B. I. *brevifolia*, II. *a. intermedia* (1,—proper), 2. *compressa*, 3. *hemisphærica*, 4. *depressa*. Of collective species (Gesammtarten), there are comparatively few (nine) in these two parts. The typographical arrangement of so many subdivisions, if not accompanied by a synoptical table, is very difficult, and, however cleverly devised, apt to confuse occasionally the student, particularly if he uses the work only for reference. In this respect, however, the authors have been more fortunate than in the preceding parts. A decided improvement is also noticeable in the abbreviations, and the more limited use of the "a. a. O." (loco citato), although our patience is still taxed severely in a few cases, as, for instance, on p. 190, line 8 from below, where the reference "Höck, a. a. O. 334, 335" carries the reader back over seven pages full of quotations to p. 183, line 1 from below. In connection with this remark, I may perhaps point out that, according to a communication by the author, the asterisks and dashes after the paragraphs containing the geographical distribution have the same meaning as the corresponding signs used by the author in his *Flora der Mark Brandenburg*, and are devised to indicate briefly the extension of the range of a species beyond the area of the *Synopsis*, a dash above the asterisk designating that the northern limit of the species lies within the area, one on the right side that the species does not extend east of the area, &c. The nomenclature, of course, strictly follows the new Berlin rules, sometimes perhaps too strictly; for it seems to us that cases like that of *Larix Larix* or *Cedrus Cedrus* might have been allowed the benefit of the more liberal construction of the rules followed in *Abies alba* (instead of *A. Picea*). Rules intended to regulate the nomenclature of a science which has a history as well as future, and grows and develops like an organism, should not be made into a Procrustean bed.

The present year will carry the work to the end of the seventh part. May equal success crown also in future the untiring efforts of the authors.

O. Stapf.

Moss Exchange Club Catalogue of British Hepaticæ. Compiled by the Rev. C. H. Waddell. London: Wesley & Son. 1897. Price 6d. Pp. 8.

This Catalogue, primarily intended for the use of the Exchange Club managed by the author, deserves the attention of all who are interested in the Hepatics of this country. With its fifty-nine genera and 220 species it provides the only complete list yet published. It is doubtful whether certain of the species and one or two of the genera will retain the position here assigned to them; but this need not be considered now, for the Catalogue does not claim to be authoritative. The classification adopted is founded upon that laid down by Spruce in his *Hepaticæ of the Amazon and Andes* and later works. Mr. Waddell is to be congratulated upon his work, and will doubtless find a ready sale for it. A trustworthy enumeration at the very least was badly wanted. The new Catalogue is more than a mere enumeration.

A. G.

ARTICLES IN JOURNALS.[*]

Annals of Botany (Sept.). — R. W. Phillips, 'Development of cystocarp in Rhodymeniales' (2 pl.).—T. Holm, '*Obolaria virginica*' (1 pl.). — P. Groom, 'Leaves of *Lathræa Squamaria* and allies.'— D. H. Scott, 'Anatomical characters presented by peduncle of

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[*] The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Cycadaceæ' (2 pl.). — W. H. Lang, 'Microsporangia of *Stangeria paradoxa*' (1 pl.).—A. J. Ewart, 'Effects of tropical insolation.'

Bot. Centralblatt (No. 35). — F. Ludwig, 'Nachträgliche Bemerkungen über die Multipla der Fibonaccizahlen und die Coëxistenz keiner Bewegungen bei der Variation der Pflanzen.'—(Nos. 35–37). Id., 'Ueber das Leben und die botanische Thätigkeit Dr. Fritz Müller's' (31 Mar. 1822–24 Mar. 1894; portr.). — (Nos. 36–38). B. Schubert, 'Ueber die Parenchymscheiden in den Blättern der Dicotylen' (1 pl.). — (No. 37). J. P. Lotsy, 'Die Localisation des Alkaloids in *Cinchona Calisaya*, &c.' — (No. 38). P. Knuth, 'Beiträge zur Biologie der Blüten.'

Bot. Gazette (31 Aug.). — E. A. Burt, '*Phalloideæ* of the United States' (cont.). — J. H. Schaffner, 'Development of stamens and carpels of *Typha latifolia*' (3 pl.). — R. E. Smith, 'The 'soft spot' of Oranges' (1 pl.). — T. D. A. Cockerell, 'New Mexican flowers and insect visitors.' — D. T. MacDougal, 'A convenient Potometer.'—W. R. Shaw, 'Parthenogenesis in *Marsilia*.'

Bull. de l'Herb. Boissier (Sept.).—C. Arvet-Touvet, 'Hieraciorum novorum descriptiones.' — H. Hallier, 'Bausteine zu einer monographie der Convolvulaceen.' — G. E. Post & E. Autran, 'Plantæ Postianæ.' — O. V. Darbishire, 'Revision der Arten der Roccellei.' —J. Briquet, 'Règles de Nomenclature.'—H. Schinz, 'Die Pflanzenwelt Deutsch-Südwest-Afrikas' (cont.).

Bull. Soc. Bot. France (xliv: 3–5: August). — P. Candargy, 'Flore de l'île de Lesbos' (concl.). — G. V. Aznavour, 'Flore de Constantinople.'—E. A. Finet, '*Arethusantha*' (gen. nov., *Orchideæ*). —M. Cornu, 'Fruits de l'*Argania Sideroxylon*.' — G. Dethau & R. Bertaub, 'Feuille anomale de *Piper*.' — R. Zeiller, 'Sur quelques fougères houillères d'Asie Mineure.' — A. Le Grand, '*Valerianella cupulifera*, sp. n., & *Ophioglossum lusitanicum* var. *britannicum*, "var. nov."'—A. Chatin, 'Appendices dans le règne végétal.'

Bull. Torrey Bot. Club (29 Aug.). — A. Zahlbruckner, 'Revisio Lobeliacearum Boliviensium.' — K. M. Wiegand, '*Galium trifidum* and allies.'—C. L. Pollard, *Viola Porteriana* & *V. flavovirens*, spp. nn. —Id., *Oxytria* Raf. (= *Schoenolirion*). — J. H. Barnhart, 'Nomenclatural Notes.'

Erythea (31 Aug.).—M. A. Howe, 'California Bryophytes' (1 pl.).

Gardeners' Chronicle (28 Aug.).—*Luddemannia Sanderiana* Kränzl., sp. n.—(11 Sept.). C. T. Druery, 'An extraordinary hybrid (?) Fern' (*Asplenium Trichomanes* × *Athyrium Filix-foemina ?*).

Oesterr. Bot. Zeitschrift (Sept.). — A. van Degen, '*Echinops orientalis* Trautv. in Europa.' — V. Lühne, 'Ueber ein subfossiles Vorkommen von Diatomaceen in Böhmen.'—R. v. Wettstein, 'Zur Kenntniss der Ernährungsverhältnisse von *Euphrasia*-Arten.' — R. Heller, 'Zur Kenntniss der Wirkung elektrischer Ströme auf Mikroorganismen.'

Pharmaceutical Journal (4 Sept.).—E. M. Holmes, '*Strophanthus Nicholsoni*, sp. n.' (fig.).

BOOK-NOTES, NEWS, &c.

The valuable addition to our knowledge of the Moss-flora of the Azores, published by M. J. Cardot in the *Eighth Annual Report of the Missouri Botanical Garden* (April 14, 1897), nearly doubles the total of species recorded as occurring in those islands. The last previous list was that contributed by Mr. Mitten to Godman's *Natural History of the Azores* (1870), and was known to only a few bryologists. That list contained forty-four Mosses and three Sphagna. M. Cardot now indicates eighty Mosses and eight Sphagna, and expresses his belief that this total might be doubled easily. He describes eight new species and three new varieties, and adds the name of a new *Sphagnum* detected by Dr. Warnstorf. Another new species is described in the list of nineteen Mosses from Madeira, which brings the present paper to a close. The collections were made by Mr. Trelease and others. M. Cardot's interesting remarks about the distribution of the species show some curious relationships between the Azores and far distant regions. The novelties are clearly and adequately figured, and cheaply to boot.—A. G.

The herbarium of the late Mr. Charles Packe, containing about 4500 sheets of Pyrenean, Swiss, and other plants, has been presented by his widow to the University of Cambridge. Charles Packe, who died at Stretton Hall, Leicestershire, in 1896, was the eldest son of Captain Edmund Packe, of the Royal Horse Guards. He was born in 1826, and educated at Eton and Christ Church, Oxford, taking his degree in 1849, and being called to the bar in 1852. He never practised seriously. In 1857 *The Spirit of Travel*, one of his first publications, witnessed to his love of the mountains; and this love led him from this date onwards to spend long periods in the Pyrenees. The mere gymnastic effort of reaching a difficult summit did not appeal to him; his aims were wider and deeper, so that his excursions became long scientific explorations—researches into the topography, climate, botany, and geology of vast solitudes. His most important work was done on the Spanish side of the chain, a region where but in part one botanist, Ramond, had preceded him. A man of remarkable constitution and character, he wandered, often alone, on dangerous glaciers, roped between two powerful Pyrenean wolf-dogs, sleeping in a bag of sheepskins; and thus, independent of the world far below him, was able to explore where few others could or cared to go. Under such conditions was his herbarium formed. The Alps and the Sierra Nevada, too, were visited by him. In 1862 he published his admirable *Guide to the Pyrenees*, and in 1864 and 1867 new editions followed. Those who would wish for more information will find it in the *Alpine Journal* (xviii. 1896, p. 236), and the *Bulletin du Club Alpine Français* (Oct. 1896). Among his botanical friends two demand mention—Mr. G. C. Churchill, and the late Mr. John Ball, the latter, indeed, a man of similar tastes; and at one time he was a frequent visitor to the Botanical Department of the British Museum. His firm yet very unobtrusive character won for him immense respect, both at home and among the inhabitants of the far-away valleys of the whole Pyrenean chain.

Mr. E. M. Holmes has issued the ninth fascicle of his important *Algæ Britannicæ rariores exsiccatæ.* In this the plants of more especial interest are *Blastophysa rhizopus* (Cumbrae), *Chlorochytrium inclusum* (Weymouth), *Choreocolax albus* (Gosport), *Dichosporangium repens* (Lossiemouth), *Ectocarpus luteolus* (Isle of Wight), *E. Padinæ* (Exmouth), *Phæostroma pustulosum* (Berwick-on-Tweed), and *Streblonema æquale* (Isle of Wight): these have only been described within the last few years. Another interesting plant is *Bonnemaisonia hamifera,* on which we print a note by Mr. Holmes on p. 408. Only twenty-five copies of each fascicle are issued.

British botanists will hail with delight the announcement that Mr. Alfred Fryer, whose important contributions to our knowledge of *Potamogeton* have for many years appeared in our pages, has in preparation a monograph of the genus, so far as it is represented in Britain. The object of the work is to supply a long-needed set of good and reliable illustrations of our Potamogetons; and both descriptions and illustrations will include the varying forms and states as well as the generally recognized species. The synonymy, though not aiming at absolute completeness, will be ample for all working purposes. An attempt will be made towards a natural arrangement of the species founded on the changes of form in their progressive stages of growth rather than on the comparatively limited distinctions afforded by the fruit, illustrations of which will form a special feature. Mr. Robert Morgan, whose drawings of the genus have been recognized as extremely satisfactory, will prepare the plates. The work, which will be issued in monthly parts, is in an advanced stage, and its issue will shortly begin.

The Royal Gardens, Kew, have been somewhat prominently before the public during the past month. Certain arbitrary rules restricting the taking in of hand-bags have been set aside by the magistrates; the labourers have petitioned for an increase of wages; and the agitation for the earlier opening of the Gardens has gained force and popular support, as is shown by the coöperation of *Punch* and the *Daily Telegraph.* Twenty years ago Dr. Trimen expressed himself in this Journal in favour of the earlier opening, and the arguments in support of their remaining closed do not seem to us by any means conclusive. Of more importance to botanists than any of the foregoing matters is the recent issue of the Kew *Bulletin* for December last, followed at short intervals by those from February to September of the present year. These contain interesting matter to which we may return later.

The *Tablet* of Sept. 25 talks about the well-known "jumping beans," and says "The *carpocapsa saltitans*, to give it its scientific name, is the fruit of a tree recently found growing in a small patch of morass near Alama in Mexico." We were under the impression that *Carpocapsa* was the name of the insect which produces the jumping, and that the fruit was that of a species of *Sebastiania.*

Tab. 376.

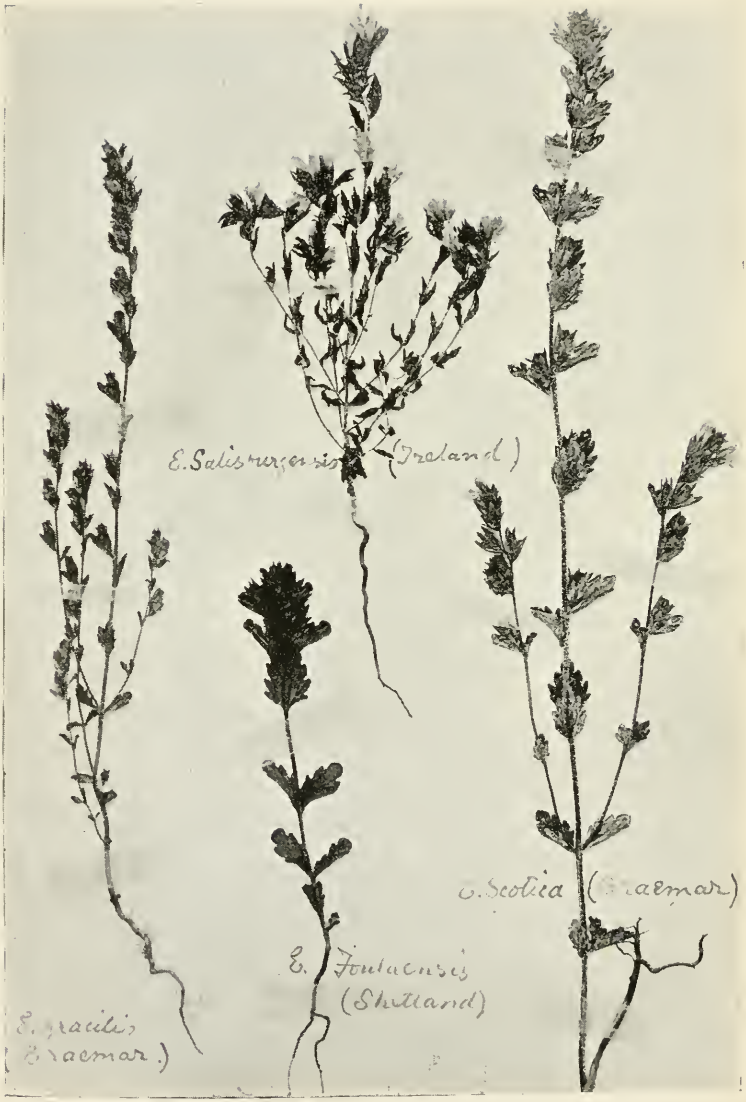
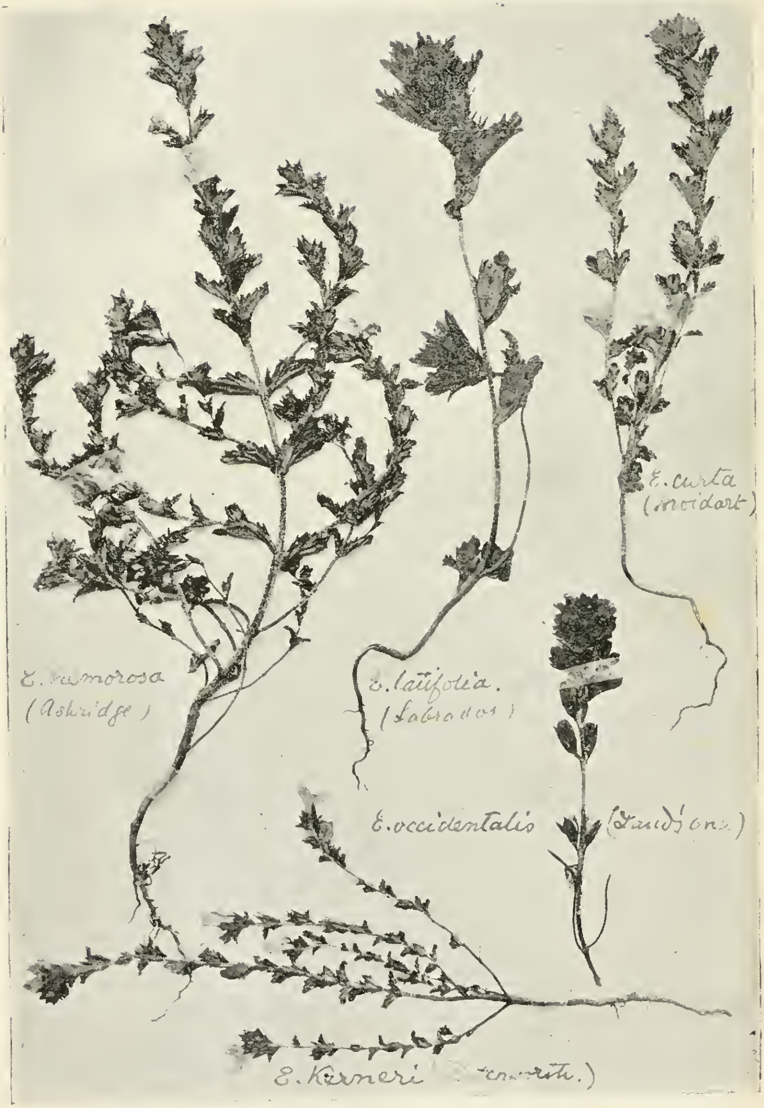

E. Salisburgensis (Ireland)
E. gracilis (Braemar.)
E. Foulaensis (Shetland)
v. Scotica (Braemar)

Photo. E. H. Boddington. Hibberd sc.

Monograph of Euphrasia.

Tab. 375.



E. nemorosa
(Ashridge)
E. latifolia.
(Labrador)
E. curta
(Moidart)
E. occidentalis
(Land's End)
E. Kerneri
([illegible]nworth.)

Photo. E. H. Boddington.

Hibberd sc.

Monograph of Euphrasia.

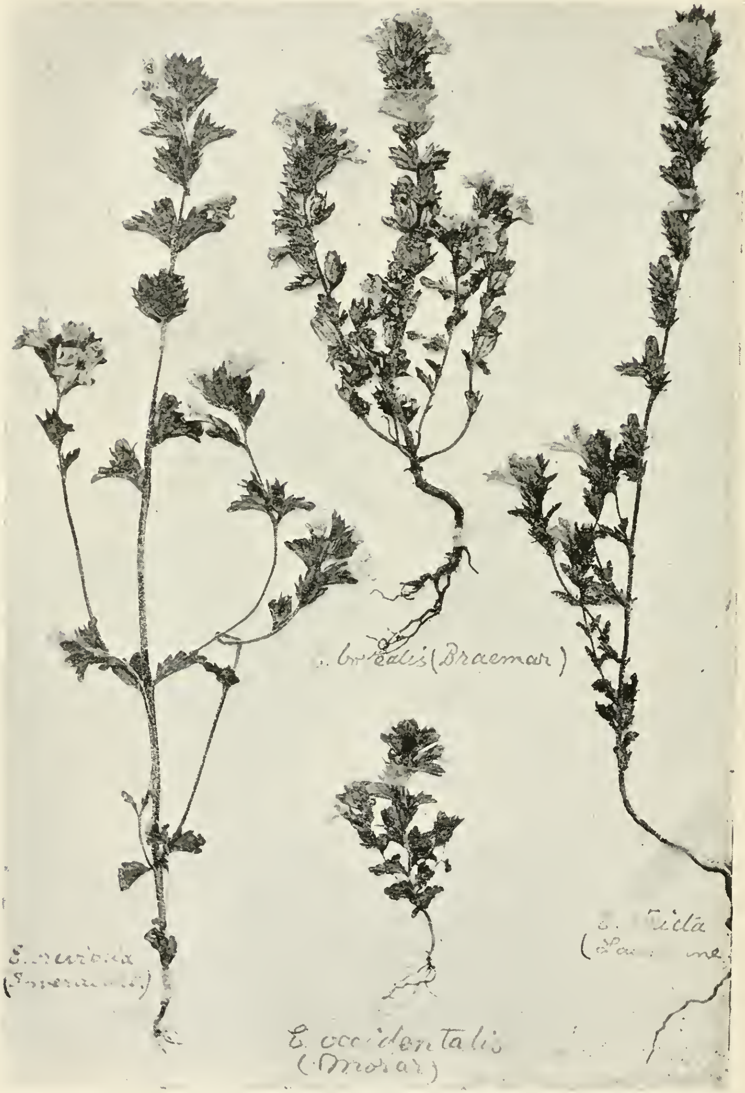

borealis (Braemar)
E. occidentalis (Morar)

Photo. E. H. Boddington.

Hibberd sc.

Monograph of Euphrasia.

MONOGRAPH OF THE BRITISH SPECIES OF EUPHRASIA

PREFACED BY AN EPITOME OF PROF. WETTSTEIN'S VIEWS ON THE DEVELOPMENT AND DISTRIBUTION OF THE EUROPEAN SPECIES.

By Frederick Townsend, M.A., F.L.S.

(Plates 374–80.)

(Continued from p. 406.)

5. Euphrasia curta

Fries, Novit. Flor. Suec. ed. 2, p. 198, 1828.—pro var. Wettst. Mon. p. 128.

Caulis erectus, crassus, rarius tenuis, plerumque in parte inferiore usque ad medium caulis ramosus, 3–40 cm. altus (plerumque 10 cm), rubescens vel fuscescens, pilis crispulis albis reversis pubescens, ramis erectis vel erecto-patentibus, hinc inde iterum ramosis oppositis. Folia infima late ovata obtusa, utrinque dentibus 1–3 obtusis, media et superiora ovata opposita acuta, basin versus latissima, utrinque dentibus acutis, sed *non aristatis* 4–7. Bracteæ suboppositæ latitudine folia caulina superantes sed breviores, sæpe fere orbiculares, utrinque dentibus 4–7 acutis *non aristatis vel in aristam brevem abeuntibus, patentes vel arcuato-recurvæ*, fructu suberectæ. Folia omnia *griseo-viridia*, infra rugosa, apicem caulis versus sæpe *smaragdino nigricantia, in pagina superiore et inferiore setulis albis dense hirsuta vel pubescentia reducta saltem in regione marginali paginæ superioris, in margine et in nervis paginæ inferioris setulis parvis obsita*. Calyx totus vel saltem in margine et nervis *albo-setulosus*, fructifer subinflatus, dentibus brevibus. Corolla circa 4–5 mm longa, labio superiore bilobo, lobis emarginatis vel denticulatis labio inferiore trilobo, lobis emarginatis, albida vel pallide lilacina striis cæruleis et macula lutea in labio inferiore notata, rarius tota cærulea vel amethystina vel labio superiore pallide lilacina, et labio inferiore albido. Capsula cuneato-obovata, matura calycem *æquans vel parum superans, truncata vel subemarginata*, margine longe ciliata, cæterum pilosa rarius glabra.

Syn. *E. parviflora* Fries Summa Veg. Scand. i. p. 195 (1846) in part.—Babington in Journ. of Linn. Soc. xi. p. 320 (1871).—*E. parviflora* var. *curta* Fries Summa Veg. Scand. i. p. 19 (1846) in part, excl. Syn.

Exsicc. Fries Herb. Norm. Fasc. iv. n. 26.

Tab. 375. Tab. 378, fig. 185–193. Reich. Icon. Flor. Germ. et Helv. xx. tab. mdcccxxxii. fig. vi.—Wettst. Mon. taf. iv. fig. 185–193, taf. vii. fig. 11.

Fl. July–October.

Distrib. Sweden, Norway, England, Scotland, Denmark, Finland, West Russia, North and East Germany, Bohemia, Tatra Mountains, Iceland.

Distrib. in England and Wales: Anglesea, below Holyhead (1883); *J. C. Melvill* (det. Wettst.).

DISTRIB. IN SCOTLAND: ABERDEEN, "Aberdeen Marshall; (H. Haus.)"; *Wettst. Mon.* CAITHNESS, ? grassy headlands, Downreay (1885); *H. E. Fox.* INVERNESS, Rostven, Moidart (Aug. 2, 1894); *S. M. Macvicar* (det. Wettst.). PERTH, Tumbling Bay; (J. Britten comm.). SUTHERLAND, abundant from Melvich to Bettyhill (1897).

DISTRIB. IN IRELAND. I have seen no specimens.

The following are localities I give for the var. *glabrescens* Wetts. = "*E. nemorosa* ad *curtam* vergens" (Wettst.).

SURREY, Haslemere (1894); *E. S. Marshall* (= *E. nemorosa* s. l. *Wettst.*). Pirbright (1881); *W. H. Beeby.* WARWICK, Moreton Road (det. Wettst.). Honington (det. Wettst.). WORCESTER, Old Stourbridge (1889); *R. F. Towndrow* ("or *E. nemorosa* s. l." Wetts. det.).

E. curta is most nearly allied to *E. nemorosa.* The latter is quite glabrous, whereas *E. curta* is as a rule remarkably hirsute but never glandular: nevertheless forms occur which are nearly glabrous and which may be distinguished from *E. nemorosa* by the presence of hairs on the upper side of the leaves and bracts, on the edges of the same and on the calyx. These intermediate forms occur frequently where the areas of the two species meet as in England; they have been already noticed under the head *E. nemorosa;* Prof. Wettstein names them *E. curta* v. *glabrescens.*

Slender forms occur which may be taken for *E. gracilis*, but the rugose character of the under surface of the leaves and bracts and the presence of hairs are distinguishing characters. The specimens from Freshwater Downs and Catherine's Cliff referred to this species in the Monograph (Wettst.) are glandular and must be referred to *E. occidentalis* Wettst.

Fries first described *E. curta* in *Flora Hall.* and in *Novit. fl. Suec.* ed. 2, p. 198 (1828) as *E. officinalis* B. *montana* δ *curta.* His short diagnosis and the specimens in *Herb. Norm.* Fasc. iv. named *E. officinalis curta*, Fr. Novit. p. 198, certify this. In later years he included other species under the name *curta* and also under the name *parviflora.* Prof. Wettstein believes that hybrids occur between *E. curta* and *E. stricta* and *E. brevipila*, in localities where these three are found together.

The plant gathered July 7th 1883, by H. E. Fox on grassy headlands, Downreay, Caithness, which I enter provisionally here, is a very remarkable one. Prof. Wettstein has not ventured an opinion respecting it. The following is a description. Caulis simplex, 3 cm. altus. Folia obtusissima, ovato-rotunda, fere glabra, dentibus paucis obtusis, bractearum superiorum infimis acutis. Spica densa. Corolla parva plerumque purpurea. *E. curta* is abundant on the moors and pastures from Melvich to Bettyhill; on the higher ground above the cliffs. At Melvich a much branched form about 6–7 cm high occurs with large flowers 10 mm long, with the upper lip pale lilac, the lower lip white; it is densely hairy and in fruit the bracts are erect and clasping the fruit. On the short grass in very exposed situations, a very small form with small flowers occurs, and the plant is often quite glabrous.

6. EUPHRASIA OCCIDENTALIS

Wettst. Mon. p. 135.

Caulis ascendens, crassus, in speciminibus visis ca–4–7 cm altus infra medium ramis arcuato-erectis, fuscescens pilis albidis crispulis reversis obsitus. Folia infima in speciminibus omnibus a me visis evanida; superiore ovata, acuta, dentibus *utrinque 3–5 acutis, bracteæ dense imbricatæ* late ovatæ acutæ, dentibus *utrinque 4–7 acutis,* folia omnia sicca plicato-furcata *tota setis parvis strictis et insuper pilis glanduliferis brevibus obsita.* Spica non elongata densa. *Calyx indumento ei foliorum conformi* dentibus lanceolatis acuminatis, fructifer vix accretus. Corolla parva, 4–5 mm. longa, tubo incluso, labio superiore bilobo lobis integris, labio inferiore trilobo lobis emarginatis, albida (? ex sicco). Capsula elliptica, emarginata, margine ciliata, calycem æquans vel superans.

Tabs. 374–375. Tab. 378, fig. A. 1–8. Wettst. Mon. taf. xi. fig. 13.

DISTRIB. North-west France, England, Scotland, Ireland.

DISTRIB. IN ENGLAND: CORNWALL, Kynance Cove, Helston; *James Cunnack* (= *E. officinalis* var. *tetraquetra* J. Cunnack, No. 921, June 1879), det. Wettstein. St. Mary's, Scilly (1862), det. Wettstein. Heath near Hayle, W. Cornwall; *J. Groves* (1880), det. Wettstein. Land's End (ex Herb. E. F. Linton; *E. maritima*, fide Mr. J. Ralfs, legit H. S. Thompson, July 1888), *det. Wettstein.* DEVON, Sandhills at mouth of the Avon, Bigbury parish (Sept. 1894); *E. S. Marshall*, det. Wettstein. HANTS, Freshwater Downs and St. Catherine's Cliff, I. of W. (1881–83), det. Wettstein.

DISTRIB. IN SCOTLAND: INVERNESS, Morar Bay (1897). SUTHERLAND, Melvich to Bettyhill (1897).

DISTRIB. IN IRELAND: CORK, Poorhead (1895); *R. A. Phillips* (det. Wettstein).

Prof. Wettstein terms this a provisional species, as when he went to press with his Monograph he had only seen specimens in the Botanical Museum of Florence, from the island of Ouessant in France, though he says some other specimens from the mountainous pastures of Campania, "alla pianca de Cordoni" presso M. Cavallo, Sept. 1872 (lg. Ferracciano) very closely resemble those from Ouessant. Prof. Wettstein has since named a plant, *E. occidentalis*, which was gathered by Mr. H. S. Thompson in January 1888 at the Land's End Cornwall, and named *E. maritima* by Mr. J. Ralfs. Mr. Druce of Oxford also informs me he has specimens from Devonshire which Prof. Wettstein thinks may be *E. occidentalis.* The character of the ls. and bracts of the Cornish plant is as follows, "folia infima subcuneato-ovata vel cuneato-oblonga obtusa utrinque dentibus 1–2 obtusis, bracteæ inferiores, ovatæ vel subcuneato-ovatæ obtusæ utrinque dentibus 2 obtusis, bracteæ intermediæ et superiores subcuneatæ ovatæ obtusæ, vel acutæ utrinque dentibus 3–4 acutis." The ls. and calyx are very slightly hirsute. Prof. Wettstein says *E. occidentalis* comes very near *E. curta*, in habit, in the size and form of the flowers and in the hirsute leaves and calyx, but the presence of glandular hairs which he has never seen in *E. curta* distinguish it. He further remarks that future observation must determine whether the glandular hairs are the result of hybridity. The plant from Freshwater Downs and Catherine's Cliff referred to in Wetts. Mon. p. 132 as *E. curta* Prof. Wettstein now refers to *E. occidentalis*, as I pointed out to him that it is glandular. See remarks under *S. borealis*.

In the neighbourhood of Morar Bay, Inverness-shire, a plant which I can only put to *E. occidentalis* occurs abundantly in short pasture, very dwarf, often much branched and with small flowers, the lobes of the lower lip of the corolla being often parallel-sided, the lower leaves broad numerous and crowded, the bracts with only an occasional glandular hair, and hybrids between it and *E. brevipila* are found where the two plants grow together. These hybrids are also of small stature and are generally morphologically nearer to *E. occidentalis*, having its foliage and small flowers, but the whole plant being very glandular. Another plant which I also refer to *E. occidentalis* occurs on the cliffs facing the sea north-west of Melvich, Sutherlandshire. It has also very small pale purple flowers cuspidate bracts and is nearly glabrous; it is associated with dwarf plants of *E. curta*, from which it is very distinct. I cannot put these plants from Morar Bay and from Melvich cliffs to any other species than *E. occidentalis*, and if I wrongly refer them to it they must be distinct. *E. occidentalis* occurs in a glandular and eglandular form; the eglandular form may be known from dwarf forms of *E. gracilis* by the green colour of its foliage, by its broader leaves and bracts, by its more pronounced and numerous setæ, broader calyx-teeth and shorter capsule—from *E. stricta* and *E. borealis* by its smaller flowers and non-aristate calyx and bracts,—from *E. nemorosa* by its erect branches less acute and non-aristate toothed bracts, from the glabrous form of *E. curta* also by its less acutely toothed bracts non-erect in fruit, and from all these except the last by its short spike and densely imbricated bracts,—from dwarf and glabrous forms of *E. brevipila* by its small flowers and non-aristate bracts. *E. occidentalis* is as yet a form which is little known. Prof. Wettstein in his Monograph described it from specimens found in one station, in France, though he now refers to it specimens from stations in England and Ireland. It seems to be a species with an area extending much further north, and its occurrence on the north-west and extreme north coasts of Scotland extends its area very considerably; that it should occur in a glabrous form is not surprising when we consider that *E. brevipila* occurs in a glabrous form in the Highlands, a form which Prof. Wettstein has never seen.

7. EUPHRASIA LATIFOLIA

Pursh. Flor. Am. sept. ii. p. 430 (1814).—Wettst. Mont. p. 136.

Caulis *erectus strictus* simplex vel in parte inferiore vel ad medium ramis paucis erectis, pilis albidis crispulis reflexis obsitus rubescens vel fuscescens, 5–18 cm. altus. Folia caulina pauca *internodiis elongatis, ovata vel cuneato-obovata,* obtusa *utrinque dentibus 2–5 obtusis;*

bracteæ dense imbricatæ late ovatæ vel fere orbiculares basi cuneatæ obtusiusculæ vel breviter acutæ, dentibus *grossis-acutis sed non aristatis* utrinque 3–6. *Folia omnia vel tota vel solum in margine et in nervis paginæ inferioris setis albidis robustis hinc inde etiam pilis glanduliferis obsita*, sicca non vel modice plicata. Flores subsessiles; calyx indumento ei foliorum conformi, dentibus latis acutis sed non acuminatis, fructifer accretus. Corolla parva bracteas vix excedens, dorso 5–7 mm longa, tubo anthesin non elongato, labio superiore bilobo lobis reflexis *denticulatis*, labio inferiore trilobo, lobis emarginatis, albida, labio superiore lilacino, inferiore macula lutea et striis lilacinis, hinc inde tota lilacina vel purpurascens (?, nam ex sicco). Capsula elliptica emarginata, margine erecto-ciliata, cæterum pilosa, *calycem æquans vel superans*.

Syn. *E. officinalis* var. *latifolia* Lange Bemerk. ved. det. 49. Hfte. af Fl. Danic. 1877 (sec. ref. a Warming in Just Bot. Jahresb. vi. datum).—*E. officinalis β. latifolia* Lange Overs. ov. Grönl. Flora p. 79 (1880). — *E. officinalis β. Tatarica* Benth. in DC. Prodr. x. p. 552 (1846) ex parte.—*E. officinalis* var. *hypoborea* Favr. in Shed. —*E. pusilla* Godet et *E. officinalis* var. *rotundifolia* Hook. sec. Reuter.

Exsicc. Exs. der Dansk geol. og geogr. Undersögelse af Groenl. 1884 et 1885.

Fig. Tab. 375. Tab. 379, fig. 194–199. Flor. Danic. n. 2910 (sec. Lange Nomenclator Flor. Dan.) *E. latifolia* Pursh. Wettst. Mon. taf. iv. fig. 194–199, taf. xi. fig. 11–12.

Fl. July, Aug.

Distrib. Greenland; Labrador; Cumberland; Lapland; Arctic Norway; North Finland. Faroe Islands. Scotland.

Distrib. in Scotland: Sutherland, West of Melvich, on grassy top of cliffs (July 15, 1897); coast near Coalbackie, Tongue Bay (July 26, 1897); bank above Naver Hill, forma *grandiflora* Wettst. (July 17, 1897); *E. S. Marshall.*

Prof. Wettstein thinks it probable that this species has a wider range throughout Arctic Europe, Asia and America.

Specimens from Greenland and Cumberland are mostly glandular, those from other localities are mostly eglandular. Some specimens from Lapland differ considerably from the type. *E. latifolia* is a somewhat polymorphic species, as would be expected from its wider range. Robust forms have densely imbricated, broad and coarse teeth, but these characters are not so evident in slenderer forms. *E. Tatarica* and *E. curta* are the most nearly allied species, and the areas of these species touch that of *E. latifolia.* From the former it may be distinguished by the imbricated and non-aristate bracts, and the presence, usually, of glandular pubescence; from the latter, by the less abundant but coarser pubescence, large flowers, blunter and more distant teeth, also by its fewer stem leaves; from *E. Foulaensis* by its more hairy and smaller, sharply toothed bracts: the teeth being also more patent, and by its more hairy calyx.

I had two specimens gathered by the Rev. E. S. Marshall in 1896 on cliffs west of Melvich, Sutherland, which I sent to Prof. Wettstein for his opinion respecting them, and he wrote on the ticket, "? *E. latifolia* Pursh." The plants are a little

over 4 in. in height, with distant stem leaves, a few erect branches from below the middle; rotund, very obtuse leaves and bracts, the middle and lower teeth obtuse patent, the lower teeth of the upper bracts only, acute and decurved. The hairs on the leaves and bracts are numerous, are many-celled and wavy; but I could detect no glands.

I can now record that I have just received good specimens of *E. latifolia* from Mr. Marshall, who again visited the north coast of Scotland this year and was so fortunate as to find the plant in the three separate stations which I have given above. Mr. Marshall sent specimens, from these stations, to Prof. Wettstein, who confirms the naming and calls the Bettyhill plant, *forma grandiflora* Wettst. The flowers in all the stations are white and the plants are eglandular. Mr. Beeby remarked in a letter lately received that "as the plant occurs in the Faroes, it certainly seems possible we may get it in Britain; still Shetland and all Britain come within the 60-fathom line, but soon after we get north of Britain, the soundings deepen immensely, so that Shetland is separated from the Faroes by water 350 fathoms deep." On the other hand *E. borealis* occurs in the Faroes and is frequent in Scotland.

Prof. Wettstein adopts Pursh's name, though Pursh cites as his plant from Labrador the *E. latifolia* Willd. (Spec. Plant. 3, p. 192), which is *Parentucellia latifolia* L. and which does not occur in Labrador, but is very like *E. latifolia* Wetts. If *Parentucellia* be ever again united to *Euphrasia*, *Euphrasia latifolia* will require another specific name. No other species of *Euphrasia* has been found in Labrador.

8. Euphrasia Foulaensis

Towns. in Wettst. Mon. p. 139.

Caulis strictus erectus vel flexuosus simplex rarius ramis paucis, 2–12 cm altus, fuscescens, glabrescens vel pilis albidis crispulis obsitus. Folia caulina infima cuneata obtusa utrinque dentibus 1–9 *obtusis*, media et superiora pauca internodiis foliis longioribus disjuncta, *ovata obtusa*, *dentibus obtusis* utrinque 2–3. Bracteæ foliis superioribus similes, interdum acutæ dentibus acutis sed *nunquam acuminatis vel aristatis.* Folia omnia glabra infima solum margine minutissime setulosa vel in nervis et margine breviter setosa. Spica densa, post anthesin modice elongata. Flores subsessiles. Calyx glaber vel parce setosus dentibus triangulari-lanceolatis non aristatis. Corolla parva, circa 5 mm longa, tubo semper incluso, plerumque *purpurea*, rarius albida labio superiore solum colorato, labio superiore bilobo lobis integris, labio inferiore trilobo lobis emarginatis. Calyx fructifer accretus. Capsula elongata elliptica, emarginata, margine ciliata, *evidenter calycem superans.*

Fig. Tab. 376. Tab. 379, fig. 200–204. Wettst. Mon. fig. 200–204, taf. xii. fig. 7–8.

Fl. July, Aug.

Distrib. Shetland Islands: ? Gotland; Faroe Islands; Oesteroe; Kodlew bei Eide.

Distrib. in Shetland: Hammerfeld, Foula (Beeby; H. Towns.);

Burrafirth, Unst (Beeby; H. Towns.); Vord Hill, Unst (Beeby; H. Towns.); Ollaberry, Northmaven (Beeby; H. Towns.); *Wettstein, Mon.* Banks by the Loch of Cliff, Unst (1886); *W. F. Beeby.*

Distrib. in Faroe Islands: "?Gotland. Faroe(lg.?; H. Towns., H. Petr.)." "Oesteroe. Kodlew bei Eide, 200 m. s. m. (lg. Simmons)"; *Wettst. Mon.*

E. Foulaensis was first found in Foula among heather, at an altitude of 1000–1200 ft.; it approaches *E. latifolia* in habit and is geographically associated with it. Both species occur in the Faroer Islands. It may be distinguished, from *E. latifolia* by its nearly glabrous leaves, bracts and calyx, the bracts being also smaller and more distant—from *E. gracilis* by its obtuse and obtuse-toothed bracts, by its larger and broader capsule,—from *E. nemorosa* by its simple or little-branched stem, its obtuse and obtuse-toothed bracts and longer capsule. As this species has been so lately distinguished, its distribution and the permanence of its characters have not yet been ascertained. Prof. Wettstein has lately referred plants, gathered by Mr. Marshall from several stations in Caithness and Sutherland, to *E. Foulaensis.*

9. Euphrasia gracilis

Fries, Flora Halland. p. 104 pro var. *E. officinalis* (1818).—Novitiæ Flor. Suec. Mant. iii. p. 62 (1842).—Wettst. Mon. p. 143.

Caulis erectus strictus tenuis simplex vel *in parte media ramis stricte erectis* nonnullis oppositis, pilis brevibus crispulis reversis adspersus, rubescens vel fuscescens, 3–20 cm altus, foliis usque ad florendi tempus plerumque persistentibus. Folia cuneata, infima obtusa, utrinque dentibus 1–3 obtusiusculis, media et superiora ovata sæpe cuneata, acuta, dentibus utrinque 3–4 acutis. Bracteæ suboppositæ, ovatæ, sæpe cuneatæ, utrinque dentibus 3–5 acuminatæ, cuspidatæ, erectæ rarius erecto-patentes. Folia omnia parva internodiis conspicue breviora, viridia vel rubescentia, glaberrima, sed in pagina superiore et in nervis paginæ inferioris pilis paucis brevissimis aspera, in speciminibus siccatis nitida, non plicata, sæpe nigricantia. Spica initio condensata, mox valde elongata, flores subsessiles. Calyx glaber, dentibus lanceolatis acuminatis, fructifer subinflatus, dentibus triangulari-lanceolatis. Corolla circa 4–6 mm longa, labio superiore bilobo, lobis integris vel subdenticulatis, labio inferiore labium superiorem excedente, trilobo, lobis emarginatis angustis, extus glabrescens, albida at striis cæruleis maculaque lutea in labio inferiore picta, vel labio cærulescente, vel tota cærulea vel violacea. Capsula lineari-elliptica truncata subemarginata, bracteam suam excedens, calycem æquans vel superans, margine ciliata cæterum glabra.

Syn. *E. officinalis* B. *montana* γ. *gracilis* Fries, Nov. Flor. Suec. ed. 2, p. 198 (1828). — *E. nemorosa* C. *parviflora* α. *gracilis* Soyer Willemet. — *E. officinalis* B. *stenophylla* β. *micrantha*, γ. *gracilis* et δ. *retusa* Reich. f. Icon. Flor. Germ. et Helv. p. 58 (1862).—*E. officinalis* δ. *alpestris* n. 4, Koch, Synops. Fl. Germ. et Helv. ed. 1, p. 545 (1837).—*E. rigidula* Jord. Pug. pl. nov. p. 134 (1852).—Gren. Flor. Jur. p. 566 (1865). — Boreau, Fl. d. centr. d. l. Fr. ed. 3, p. 193

(1837).—*E. gracilis* Nov. Fl. Suec. Mant. iii. p. 62.—Fries, Summ. veg. Scand. i. p. 195 (1846).

Exsicc. Reich. excurs. No. 242 (as *E. micrantha*). — Billot, Flor. Gall. et Germ. exs. No. 1127 (as *E. officinalis*).—Fries, Herb. Norm. ii. No. 30.—Kerner, in Schedæ ad Flor. exsicc. Aust.-Hung. i. p. 117, No. 636 (as *E. micrantha*).

Fig. Tab. 376. Tab. 379, fig. 216–222. Reich. Icon. Flor. Germ. et Helv. xx. tab. mdccxxxii. fig. iv., v. et vii.—Sower. Eng Bot. 3rd ed. tab. dccccxci., with exception of fig. on right. — Wettst. Mon. taf. iv. fig. 216–222. Taf. viii. fig. 2 & 3.

Fl. June–Sept.

Distrib. Widely distributed in North Europe, especially in Sweden, Norway, Scotland, Denmark, Belgium, Holland, North-east France, Germany, Poland, Northern Hungary.

Heaths, moors, commons, &c., on a light soil from Shetland to Sussex; very abundant throughout Scotland. I have no record for Wales.

Distrib. in England and Wales: Berks, Greenham Common (1835); *Britten comm.* Cumberland, Rosthwaite (1884). Surrey, Whitley Common (1883); *Eyre de Crespigny.* Hindhead (1884); Pirbright; near Ewhurst (1884); *W. H. Beeby.* Milford Heath; *E. S. Marshall.* Esher ($\frac{765}{6}$, 1848); *H. C. Watson.* Sussex, near Eastdean (1881); *F. C. S. Roper.* Hingston Down (1827); *J. Woods Herb.* Warwick, Balsall Common (1882); *H. Bromwich.*

Distrib. in Scotland: "Aberdeen, Aberdeen (Nicholson; H. Haus.; *Wettst. Mon.* Glen Callater (1882); *J. W. Frail* (*G. Nicholson*). Braemar (1890). Argyll, "Scotstown Moor (Townsend; H. Fr.)"; "Oban (Townsend; H. T. Z."); *Wettst. Mon.* Compton Quarries, Inverary (1892); *E. S. Marshall.* Caithness, Reay (1889); *W. F. Marshall.* Inverness, "Foyers (Townsend; H. T. Z.)"; *Wettst. Mon.* Glenelg (1897). Glen Spean (1896); *W. F. Marshall.* Kincraig (1891); *A. Somerville* (J. Britten comm.). Perth, Loch Tummel (1865). Ross, Kinloch Ewe; *E. Salmon.* Loch Maree (1883); *C. Bailey* (J. Britten comm.). Whole neighbourhood of Poolewe and Loch Maree (1897). Shetland, Shetland (1890); Collafirth in Ollaberry, Northmaven (1881); *W. H. Beeby.* Sutherland, Melvich (1889); *W. F. Marshall.* Bettyhill (1897). Melvich and between that and Armidale (1897).

Distrib. in Ireland: Meath, Oldcastle (1896); *R. Lloyd Praeger.*

E. gracilis is one of the most marked species of the genus. Its slender erect form, small leaves and flowers, and usually dark-coloured stem and leaves are very marked characters. It was first recognized by Fries, and described by him as a distinct species in the following terms in the 'Mantissa':—"Caule tereti supra medium florifero, foliis oblongo-lanceolatis utrinque tricrenatis, floralibus basi cuneatis acuminato-dentatis in apicem floriferis, corollæ tubo labium superante, galea porrecta subintegra, fauce glabra, capsula lineari-oblonga truncata." He says he at first confounded it with *E. Salisburgensis.* He dwells particularly on the terete stem, the lower half bearing no flowers, and on the calyx not being "nigropunctato," but "epunctato." The leaves and bracts of the Scotch plant have usually only three teeth on either side, and the lowest flower is rarely below the middle of the stem. Kerner distinguishes *E. micrantha* Reich. as distinct by the short awn-like ending of the upper bracts, by its shorter calyx, the teeth not exceeding the capsule; but these are characters frequently found in Scotch specimens of *E. gracilis*, and connected by every intermediate form. Prof. Wettstein says that in the South it flowers frequently in June, in Sweden and Norway in August and September. In Scotland I have found it in flower in May.

Small forms of *E. nemorosa* may be mistaken for *E. gracilis*, but the shining upper surface and erect position of the leaves and bracts will distinguish it, those of *E. nemorosa* being dull and patent. From *E. Salisburgensis* it may be distinguished by the ciliate margins of the capsule, the capsule of *E. Salisburgensis* being quite glabrous. In the Queen's Drive, Braemar, it occurs with short, white, abundant pubescence, particularly on the under sides of leaves and bracts and calyx, also with aristate toothed bracts = var. *Friesii* Sanio (Verh. bot. Ver. Prov. Brandenb. xxxii. S. 123, 1891). At Kinloch Ewe, it occurs with larger and wholly blue flowers, = var. *primaria* Fries (Nov. Fl. Suec. Mantissa, iii. p. 62).

10. EUPHRASIA SCOTICA

Wettstein, Wettst. Mon. p. 170. *E. paludosa* Towns. in Journ. Bot. 1891, p. 161, tab. 305.

Caulis erectus firmus, 10–26 cm altus, simplex vel in parte inferiore vel in medio ramis brevibus oppositis 2–4 suberectis, purpureo-fuscescens, pilis brevibus albidis reflexis subadpressis pubescens. Racemus infra interruptus, flores infimi circiter ad medium caulem. Folia infima persistentes. Folia et bracteæ rigida, ovato-oblonga vel ovata, margine pilis brevibus strictis cæterum fere glabra, in pagina inferiore et hinc inde in pagina superiore, sæpe efflorescentia albida squamosa. Dentes foliorum et bractearum triangulares, 3–4 utrinque, in foliis et bracteis inferioribus obtusi, in intermediis et superioribus acuti, breviter acuminati vel aristati, infimi sæpe incurvi, bracteæ summæ basi cuneatæ. *Calyx plerumque brevior quam bractea; calycis dentes patentes late triangulares acuti, capsulam æquantes vel parum superantes;* nervi et dentes plerumque obscure picti et setulis brevibus pubescentes. Flores parvi albi (vel labium superius pallide lilacinum) nervis obscure purpureis et fauce et labio inferiore macula flava; fauce aperto; *labium inferum superum longitudine æquans et tubum subcurvatum superans;* lobi labii inferioris subæquales, emarginati; lobi labii superioris porrecti, emarginati. Stigma curvatum. Capsula oblonga, *basin versus angustata*, longitudine latitudinem cca. duplo superante, in parte superiore ciliata mucrone plerumque emarginaturam non superante, calycem æquans vel superans.

SYN. *E. paludosa* Towns. in Journ. Bot. xxix. p. 161 (1891) non R. Br.

EXSICC. Schultz, Herb. Norm. Nov. Ser. No. 2873 (as *E. paludosa* Towns.).

Fig. Tab. 376. Tab. 379, fig. B 1–7. Journ. Bot. 1891, tab. 305. Wettst. Mon. taf. viii. fig. 8.

Fl. August–Sept.

Distrib. Highlands of Scotland. Aberdeen, Braemar (1890, at an altitude of 1114 ft. and upwards). Inverness, Glen Spean (1896, up to 2000 ft.); *E. S. Marshall.* Edge of Hill Loch, Moidart (1894, from 850 to 900 ft.); *S. M. Macvicar.* Moors of Glenelg (1897). Ross, Ben Eay, "in abundance" (1896, from 1000 to 1400 ft.); *C. E. Salmon.* Moors above Loch Maree Hotel; abundant on moors east and west of Loch Ewe, and descending to within a few feet of sea-level, 1897. Shetland, Hamar Voe, near Hillswick, Northmaven (1891); frequent in Northmaven (1896), where it is very dwarf and with darker coloured flowers; *W. H. Beeby.* Sutherland, near Bettyhill and Tongue (1897); *W. S. Marshall.*

E. Scotica is found in *wet* boggy ground, usually in company with *E. gracilis* on the drier ground. The white flowers are smaller than those of *E. gracilis* and the lower lip of the corolla does not exceed the upper lip as it does in the latter species. Prof. Wettstein considers *E. Scotica* to approach *E. minima* Schleich. so closely that the only difference he can detect lies in the length of the capsule which "is shorter or at most as long as the calyx" in the specimens he has seen, while that of *E. minima* "always exceeds the calyx." It appears that these relative proportions in *E. Scotica* are not constant, as specimens from Ben Eay and also from Moidart have the capsule exceeding the calyx. A marked distinction seems to lie in the form of the upper leaves and bracts of *E. Scotica* which are narrower than those of *E. minima* and have a cuneate base. *E. Scotica* also seems to prefer decidedly wetter situations.

The name "*paludosa*" which I originally gave to this species, from its habitat, had already been applied by R. Brown to an Australian species, and Prof. Wettstein has in his Monograph substituted the name *Scotica* which I am bound to accept.

E. Scotica until this year had been found only at an elevation of about one thousand feet and upwards above sea-level, but it also occurs abundantly in the neighbourhood of Poolewe (Ross-shire), Glenelg (Inverness-shire) and probably elsewhere, near the sea, only a few feet above sea-level, and inland at a low elevation.

(To be continued.)

NOTE ON PRIMULA SINENSIS.

By James Britten, F.L.S.

In the *Botanical Magazine* for October (t. 7559) Sir J. D. Hooker has an interesting account of the history of this plant, in the course of which he points out that, "though so long known under cultivation, [it] has only within comparatively few years been collected in a native state"—first by Mr. T. Watters (misprinted "Walters" throughout the article in *Bot. Mag.*) in 1879, from whom Hance received a specimen which is now in the National Herbarium, and later by Dr. Henry and the Abbé Delavay. Sir Joseph's summary of the earlier history of the plant in cultivation in this country is interesting and fairly complete, but we have in the British Museum some authentic material bearing on the subject, to which it may be well to call attention.

The drawing by which *Primula sinensis* was first made known was one of those sent from China by Mr. John Reeves in 1819. The history of this valuable collection of drawings, which is now in the Botanical Department of the British Museum, with such information as to Reeves as I was able to obtain, was given in this Journal for 1894 (pp. 293, 298): the following extract from the description accompanying the plate of *P. sinensis* in Lindley's *Collectanea* (t. 7; 1821) adds a little to what was there printed:—

"It was determined by the [Horticultural] Society that a person should be employed in making drawings of plants in the countries where they grow. For several reasons China was selected for a beginning; and particularly as being the residence of John Reeves, Esq., a corresponding and very active member of the Society, under whose immediate superintendence the draughtsman could be placed. By the direction of this gentleman, a considerable number of drawings have already been sent to England, and many of the plants they represent introduced. Among those which were received in the year 1819 was a drawing of what appeared to be a very handsome gigantic species of *Primula*, accompanied by dried specimens which confirmed the general accuracy of the figure. The attention of the Society was so strongly attracted by its beauty, that it was immediately ordered to be sent home. Seeds and a plant were accordingly procured at Canton by Mr. Reeves; but the latter unfortunately perished during its passage, and the seeds, of which there was an abundance, did not vegetate. Captain Reeves has, however, been subsequently more fortunate; having succeeded in bringing a plant over alive, which he presented to his relation Thomas Palmer, Esq., of Bromley, Kent. . . . . A superb drawing has been made from the plant for the Horticultural Society by Mr. Hooker,* of which the Council has most liberally allowed us to avail ourselves, with the approbation of Mr. Palmer."

It would appear that the drawings sent home by Reeves were his personal property: none are now to be found at the Horticultural Society,† and there can be little doubt that the figure of *P. sinensis* in the Museum is that referred to in the above extract, as it bears at its foot a note in Lindley's hand:—"specimen at Hort. Soc." In the Banksian Herbarium there is a specimen sent to Brown by Reeves apparently a year earlier than the drawing referred to, as it is written up by Brown, "China, Mr. Reeves, 1818."

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* William Hooker was artist to the Horticultural Society (see *Journ. Bot.* 1886, 51); the details of the plate of *Primula* in *Collectanea* are among the large number of the original drawings for that work lately acquired by the Botanical Department.

† See *Journ. Bot.* 1894, 298.

A note may be added on the nomenclature of the plant. Mr. Hemsley (in *Journ. Linn. Soc.* xxvi. 43, copied without acknowledgment by Mr. A. W. Sutton in *Journ. Royal Hort. Soc.* xiii. 100) says, "The names *sinensis* Sabine and *prænitens* Ker, were published in the same year, and the latter probably earlier in the year than the former"; but he contends that, "as almost every author and gardener has adopted Sabine's name, it seems better to retain it." This ground for retaining *sinensis* is insufficient, but as a matter of fact it is the earlier name, as part ii. of Lindley's *Collectanea*, in which it occurs, was published on April 1, 1821, while *prænitens* Ker (*Bot. Mag.* t. 539) dates from the 1st of May of the same year. Loureiro's *Primula sinensis*, which is of course much earlier, has never been identified, but the description shows that it is not a *Primula;* the existence of Loureiro's name, however, induced Ker to substitute *prænitens* for Sabine's *sinensis*, and his action will commend itself to those who adopt the rule "once a synonym always a synonym."

It may be noted that the plant from Terra del Fuego, mentioned by Ker (*loc. cit.*) as "recorded in the Banksian Manuscripts as *Primula antarctica*" (a name not taken up in the *Index Kewensis*) is *P. magellanica* Lehm.

DECADES PLANTARUM NOVARUM AUSTRO-AFRICANARUM

AUCTORE R. SCHLECHTER.

(Continued from p. 345.)

DECAS VI.

51. **Phylica chionophila**, sp. n. Fruticulus erectus ramosus, fere pedalis; ramulis, primum puberulis, demum glabratis, teretibus dense foliatis; foliis erecto-patentibus patentibusve brevissime petiolatis, linearibus subacutis, primum puberulis mox glabratis, marginibus revolutis, 0·5–0·8 cm. longis; capitulis subglobosis niveis ad apices ramulorum, 1–1·2 cm. diametientibus; involucri foliolis linearibus vel lineari-lanceolatis subacutis sericeo-puberulis, margine villoso-ciliatis, apice subpenicillatis, vulgo floribus æquilongis; bracteis linearibus dimidio superiore paulo dilatatis, villosis, flori æquilongis; bracteolis calyci basi adnatis, angustissime linearibus villosis, calyci paulo brevioribus; calyce c. 0·5 cm. longo, extus dense sericeo-villoso, segmentis erecto-patentibus segmentis ovatis subacutis, apice intus incrassatis, intus glabris, 0·2 cm. longis; petalis e basi breviter unguiculata rhomboideo-rotundatis, obtusis subcucullato-concavis, glabris, 0·1 cm. longis; antheris rotundatis obtusis, filamentis subulatis glabris, æquilongis; stylo crassiusculo cylindrico, 0·1 cm. longo, stigmate capitato, basin antherarum vix excedente.

In regione austro-occidentali: In saxosis montis "Mostertshoek-

berg" in ditione Ceres, alt. c. 5700 ped., Oct. 1894; *R. Marloth.* No. 1987.

Allied to *P. brachysepala* Sond. and *P. eriophora* Berg.; it is distinguished by the larger heads and involucre.

52. **Indigofera Evansii**, sp. n. Herba perennis decumbens, e basi ramosa; ramis filiformibus elongatis, glabris, laxe foliatis; foliis graciliter petiolatis erectis vel suberectis, 3-foliolatis, petiolo late obovatis obtusis, breviter mucronulatis, basi acutiusculis, breviter petiolatis, subæqualibus, 1–1·5 cm. longis, supra medium 0·8–1·1 cm. latis, petiolo usque ad 3 cm. longo; stipulis e basi oblique lanceolata subulatis, acutissimis, 0·4–0·5 cm. longis; racemis gracillimis lateralibus erectis, folia multo excedentibus, laxe plurifloris; pedunculo filiformi glaberrimo, pedicellis filiformibus glabris, calyci fere æquilongis; calyce late campanulato, alte 5-fido, vix 0·3 cm. longo strigilloso, segmentis erecto-patentibus subulatis, sinubus latis; vexillo hama unguiculato late obovato, apice breviter exciso, basi concavo, multinervi, 0·6 cm. longo, glabro; alis haud unguiculatis, oblique subfalcato-oblongis obtusiusculis, multinerviis, basi paulo angustatis, concavis, 0·6 cm. longis, medio fere margine inferiore paulo ampliatis, 0·2 cm. latis, glabris; carina naviculari, apiculata, glabra, basin versus angustata infra medium utrinque brevicalcarata, 0·6 cm. longa; antherarum apiculo amplo; ovario glaberrimo, 10-ovulato.

In regione austro-orientali: In clivis montium Drakensbergen in ditione Polela (Nataliæ), alt. 6000–7000 ped., Febr. 1896; *M. S. Evans*, No. 636.

Allied to *I. procumbens* L., but with much slenderer habit. The entire want of unguicula to the scarlet petals is remarkable.

53. **Wahlenbergia brachycarpa**, sp. n. Herba annua erecta, ramosissima, 7·15 cm. alta; ramulis filiformibus minutissime puberulis, laxe foliatis; foliis patentibus patulisve linearibus vel lineari-lanceolatis acutis vel subacutis, sessilibus, minute puberulis, 0·4–0·6 cm. longis: floribus axillaribus terminalibusque, graciliter pedicellatis, pedicellis filiformibus minutissime puberulis, 0·4–0·7 cm. longis; calyce 5-angulari, alte 5-fido, c. 1·5 mm. longo, glabro, tubo depresso brevi, segmente erectis lineari-subfiliformibus acutis, basin versus obtuse carinatis, 0·1 cm. longis vel paulo longioribus; corolla pallide cærulea, campanulata, 0·6 cm. longa, glabra, segmentis ovatis obtusiusculis erecto-patentibus; antheris linearibus obtusis, vix 0·2 cm. excedentibus, filamenti subfiliformibus medio ciliatis, vix 0·1 cm. excedentibus; stylo filiformi, 0·4 cm. longo, dimidio superiore glanduloso-papuloso, stigmatibus 3, brevibus oblongis obtusis; capsula subturbinata depressa, 3-valvis, calycis segmentis paulo ampliatis coronata, medio 0·2 cm. diametiente.

In regione austro-occidentali: In collibus arenosis prope villam Clanwilliam, alt. c. 400 ped., Oct. 1896; *L. C. Leipoldt*, No. 325.

A very distinct species approaching *W. paniculata* A. DC. in its pubescence, bearing, however, very different fruits. The flowers are blue.

54. **Helipterum Marlothii**, sp. n. Frutex erectus, ramosus, fide collectoris 30–40 cm. altus; ramis dense tomentoso-lanatis, validis, dense foliatis; foliis subimbricatis oblongo-ligulatis, subacutis, utrinque tomentosis, dorso 1-nerviis, 2–3 cm. longis, medio fere 0·9–1·2 cm. latis; florum capitulis c. 50-floris, subglobosis, c. 1·5 cm. diametientibus, ad apices ramulorum pluribus, subcorymbosis, breviter pedunculatis; involucro niveo, foliolis imbricatis erecto-patentibus, oblongis obtusissimis, flores haud excedentibus; floribus tubulosis, 0·9 cm. longis, tubo subcylindrico, dimidio superiore interiori paulo latioriore, segmentis erecto-patentibus ovatis obtusiusculis, 0·1 cm. longis; antheris anguste linearibus subacutis, basi sagittatis, 0·4 cm. longis, apices loborum subattingentibus, filamentis filiformibus glabris, 0·3 cm. longis; stylo filiformi glabro, brachiis subfiliformibus, 0·3 cm. subattingentibus antherarum apices paulo excedentibus; acheniis oblongo-cylindricis, glandulosis; pappi setis subplumosis tubo corollæ æquilongis, basi concretis.

In regione austro-occidentali: in rupium fissuris montis "Matroosberg" in ditione Worcester, alt. c. 5800 ped., Maio 1894; *Dr. R. Marloth*, No. 1994.

This is one of the plants which stands midway between *Helichrysum* Vaill. and *Helipterum* DC., having less plumose pappus-bristles than is generally the case in *Helipterum*, hardly more plumose than those of *Helichrysum sesamoides* Thbg.; yet its close affinity to *Helipterum eximium* induces me to place it in this genus.

55. **Athrixia asteroides** Bolus & Schltr., sp. n. Suffrutex pluricaulis, gracilis, 40–60 cm. altus; caulibus simplicibus vel subsimplicibus, teretibus, scabro-puberulis, foliatis; foliis erecto-patentibus vel suberectis, sessilibus, linearibus acutis, basi subcordatis, marginibus plus minusve revolutis, scabridis, internodia duplo vel plus duplo excedentibus, 3–4 cm. longis, medio fere 0·2–0·4 cm. latis; capitulis florum 2–3 cm. diametientibus, ad terminalibus pluribus laxe subcorymbosis, longe pedunculatis, distanter paucibracteatis, scabrido puberulis; involucri foliolis imbricatis, linearibus acutissimis, minute dorso puberulis; floribus radii c. 20, involucrum fere duplo excedentibus, e basi subfiliformi-tubulosa in ligulam linearem acutam vel 3-dentatam, 0·8 cm. longam, dilatatis, subtus sparsim puberulis; floribus disci tubulosis, c. 0·5 cm. longis, extus breviter hispidulis, tubo apicem versus sensim paulo dilatato, segmentis erecto-patentibus triangulo-ovatis subacutis, vix 0·1 cm. longis; antheris anguste linearibus obtusiusculis, basi subacutis, filamentis angustissime linearibus vix 0·1 cm. excedentibus; stylo filiformi, glabro, brachiis 1·5 mm. longis, antherarum et loborum apices attingentibus; achæniis subcylindricis, brevissime hispidulis, pappi setis asperis acutissimis, tubo corollæ subæquilongis, squamulis haud interjectis.

In regione austro-occidentali: In collibus, Maxwell, prope Ixopo, Nataliæ, alt. 4000–5000 ped., Jan. 1896; *M. S. Evans*, No. 625.

Nearest allied to *A. Gerrardi* Harv. from Zululand, but well

characterized by the want of interposed scales between the pappus-bristles, the totally hispidulous achenes, and the purple (not blue) ray-flowers.

56. **Diascia Pentheri,** sp. n. Herba pusilla, habitu fere *D. Bergianæ* Lk. & Otto; acaulis vel e basi 1–2 ramulosa; foliis basilaribus rosulatis, ovato-ellipticis vel ovato-oblongis, basi in petiolum laminæ fere æquilongum angustatis, obtusis, margine paucicrenatis vel paucidentatis, utrinque glabris, textura tenuiore, petiolo incluso, 1·5–3 cm. longis, caulinis minoribus breviter petiolatis; pedicellis axillaribus filiformibus, glabris, erectis vel adscendentibus, folia multo excedentibus, 3–5 cm. longis; calycis segmentis lineari-lanceolatis acutis glabris, 0·3 cm. longis; corolla bicalcarata, tubo late campanulato, lobis subæqualibus rotundatis calcaribus conicis obtusis pendulis, c. 0·4 cm. longis; filamentis subfiliformibus glabris, antheris 4 perfectis, minutis; stylo subfiliformi glabro, c. 0·1 cm. longo; capsula lineari c. 1·3 cm. longa, glabra, medio fere 0·2 cm. longa, stylo filiformi coronata; seminibus rotundatis brunneis, subtus foveolatis.

In regione austro-occidentali: In saxosis montium pone Montagu Pass, in ditione George, solo arenoso, alt. c. 2500 ped., Sept. 1896; *Dr. A. Penther.*

The fourth species in the genus with spurred, not saccate flowers, differing from *D. Thunbergiana* Spr., *D. tanyceras* E. Mey., and *D. nana* Diels, by the conical, not filiform spurs, which are only twice as long as the corolla, thus forming somewhat a connection between the spurred and the saccate species of Wettstein's section *Axillares.* The rose-coloured flowers are about the size of those of *D. Bergiana* Lk. & Otto.

57. **Orthosiphon serratum,** sp. n. Caule ramisque tetragonis villosis, bene foliatis; foliis patentibus vel erecto-patentibus ovatis vel obovatis vel ovato-ellipticis breviter petiolatis, margine serratis, utrinque puberulis, petiolo villoso incluso 1·5–2·3 cm. longis, medio fere 0·8–1 cm. latis; racemis elongatis, verticillis, 6–10-floris; bracteis parvulis roseis, ovatis acuminatis, puberulis, pedicellis æquilongis vel paulo longioribus; pedicellis patentibus, filiformibus puberulis, 0·5–0·6 cm. longis; calyce campanulato puberulo, basi obtuso, corollæ plus duplo breviore, post anthesin valde ampliato, patulo; corolla 1·2–1·5 cm. longa, tubo subcylindrico puberulo, labio superiore oblongo-obtuso, c. 0·4 cm. longo, vix 0·2 cm. longo, concavo, labio inferiore oblongo 3-lobulato, 0·4 cm. longo, c. 0·3 cm. lato, tubo intus antice minutissime hispidulo; staminibus exsertis, filamentis filiformibus, superioribus altius adnatis glabris, inferioribus dimidio inferiore sparsim hispidulis, antheris reniformibus; stylo filiformi glabro, exserto, stamina superante, seminibus rotundatis, pallide brunneis, sublævibus.

In regione austro-occidentali: In collibus lapidosis prope Barberton (Transvaaliæ), alt. c. 2800 ped., Sept. 1889; *E. E. Galpin*, No. 499.

A very distinct species, easily known by its serrate leaves, and the corolla, with the two lower stamens hispidulous at base.

58. **Thesium transvaalense**, sp. n. Suffrutex erectus ramosus, 10–15 cm. altus; ramulis subfiliformibus, subangulatis, glabris, bene foliatis; foliis erectis subfiliformibus acutissimis, margine sparsim et minute serrulatis, internodia excedentibus, 0·4–0·6 cm. longis; floribus ad apices ramulorum spicatis, spicis 5–10-floris, 0·7–1·2 cm. longis; bracteis bracteolisque erecto-patentibus subfiliformibus acutissimis, margine minute serrulatis, ciliatisve bracteis florem subexcedentibus, bracteolis florem vix æquantibus; perigonio 0·3 cm. longo, extus tubo dimidio inferiore minute hispidulo, superiore glabro, segmentis lanceolato-oblongis obtusis, 0·1 cm. longis, extus glabris intus apice pilis niveis dependentibus dense barbatis, basi fasciculo pilorum ad antheras tendentium ornatis; staminibus tubo fere medio insertis, filamentis subfiliformibus, antheris rotundatis faucem vel potius basin antherarum dimidio superiore excedentibus, 0·5 mm. longis, filamentis vix longioribus; stylo subfiliformi, glabro, 0·1 cm. longo, basin segmentorum (dimidium antherarum attingente; fructu estipitato, ovoideo, perigonio deflorato coronato 0·4 cm. longo, infra medium c. 2·5 cm. diametro; nerviis primariis secundariisque subcarinatis, tertiariis reticulatis tenuibus, tamen bene conspicuis.

In regione austro-orientali: In collibus graminosis, Elandsfontein, prope Johannisberg (Transvaaliæ), alt. c. 3500 ped., Nov. 1896; *D. F. Gilfillan* (Herb. Galpin No. 1419).

In the section *Friesea* this species should be placed at the end of the first group (characterized by the presence of a bundle of hairs in the back of the anthers), as it is separated from the rest by the spicate inflorescence, which as a rule is one of the marks of the second group. There is no stipes to the fruit.

59. **Lapeyrousea serrulata**, sp. n. Gracilis erecta, 15–25 cm. alta; cormo semigloboso, basi truncato, tunicis rigidis dimidio superiore reticulato-nervosis, mucronulatis vestito; caule ancipiti simplici vel parum ramoso, angulis serrulato glabro; folio infimo anguste lineari nervoso, caulem superante, superioribus linearibus obtusis vel mucronulatis, compressis, dorso costa serrulatis; usque ad 3·5 cm. longis, sensim in spathas abeuntibus; spathæ valvis exterioribus foliaceis obtusis, compressis, dorso costa serrulatis, 1–1·2 cm. longis, interioribus submembranaceis apice breviter 2-fidis, 2-nerviis, nerviis dorso minute serrulatis, valvis exterioribus paulo brevioribus; perianthio 6·5–7 cm. longo; tubo e basi filiformi tertia parte superiore ampliato, 5–5·2 cm. longo, fauce c. 0·4 cm. diametiente, segmentis subæqualibus e basi subunguiculato-linearis, lanceolato-spathulatis, inferioribus 3 subapiculatis, superioribus 3 obtusis, c. 2 cm. longis; supremo lateralibus paulo angustiore concavo, erecto, 0·3 cm. lato; filamentis filiformibus, fauci insertis, c. 1·1 cm. longis, antheris violaceis linearibus, obtusis, 0·5 cm. longis; stylo filiformi, brachiis filiformibus, 0·6 cm. longis, usque infra medium bifidis, apices antherarum paulo excedentibus.

In regione austro-occidentali: In sabulosis prope villam Clanwilliam, alt. c. 400 ped., Sept. 1896; *L. C. Leipoldt*, No. 383.

In the affinity of *L. divaricata* Baker, with larger spathe-valves, much longer tube to the flowers, and serrulate edges of the stem,

branches outer spathe-valves. A very distinct species. The flowers are milky white, with a tinge of blue and violet.

60. **Urginea virens**, sp. n. Gracilis, erecta, 10–20 cm. alta; bulbo ovoideo, 2–3 cm. longo; foliis sub anthesi nullis vel jam emarcidis, linearibus carnosulis, glabris, scapo brevioribus, c. 2·5 mm. longis; scapo stricto vel plus minus flexuoso, glaberrimo nudo; spica subcorymboso-abbreviata pluriflora; bracteis minutis lanceolato-deltoideis patulis, dimidio inferiore calcare deflexo filiformi, c. 2·5 mm. longo ornatis; pedicellis inæquilongis filiformibus, glabris, usque ad 1·5 cm. longis; perianthio 0·4–0·5 cm. longo, 5-foliato, foliolis oblongis obtusis, 1-nerviis, 0·2 cm. latis; staminibus suberectis, filamentis, anguste linearibus, apicem versus attenuatis, glabris, basi foliolorum insertis, 0·2 cm. longis, antheris circuitu subquadrato-rotundatis, basi apiceque excisis, 1·5 mm. longis; ovario ovoideo-glabro; stylo subfiliformi apicem perigonii attingente.

In regione austro-occidentali: In collibus carrooideis montis "Packhuisberg," in ditione Clanwilliam, "satis frequens," alt. c. 2000 ped., Jan. 1897; *L. C. Leipoldt.* In arenosis montium pone Tweefontein, in terra Konde Bokkeveld, alt. c. 5500 ped., 24 Jan. 1897; *R. Schlechter*, No. 10127.

My own specimens are not yet so well developed as Mr. Leipoldt's, but bear now and then a withered leaf or two at the base, thus enabling me to give a better description than would have been possible with either of them alone. The subumbellate inflorescence and long pedicels are a good mark of our species. The whitish flowers have a green nerve, and are tinged with green outside.

NEW OR CRITICAL BRITISH MARINE ALGÆ.

By E. A. L. Batters, B.A., LL.B., F.L.S.*

During the last twelve months the British marine algal Flora has been enriched by the addition of several new species, the most important of which are recorded below. In the *Bulletin de l'Herbier Boissier* for August, M. Chodat has described two new perforating algæ from the Isle of Man. Some new species are to be found in the recently published fasciculus ix. of Mr. Holmes's important *Algæ Britannicæ rariores exsiccatæ*. From Mr. Geo. Brebner I have received some very interesting specimens, amongst them several undescribed species. A few more species must be added to this list as the result of my own collecting.

Myxophyceæ.

1. Aphanothece pallida Rabenh. *Flor. Europ. Alg.* vol. ii. p. 64. Specimens of this species, collected at Weymouth, have been distributed by Mr. Holmes in his *Algæ exsiccatæ*.

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* See *Journ. Bot.* 1895, 274–6; 1896, 6–11, 384–390.

2. Hyella voluticola Chodat in *Bull. de l'Herb. Boissier* t. v. No. 8 (August, 1897), p. 716.

This species, which was found by M. Chodat on the coast of the Isle of Man, is said to differ from *Hyella cæspitosa* Born. et Fl. in its pinkish-purple colour, a slight difference in the structure of the sheath, the shorter branches, and the absence of true sporangia. From M. Chodat's account of it there can be little or no doubt that it is the same plant that I have called *Hyella cæspitosa* var. *nitida* (vide *Journ. Bot.* 1896, p. 385). More fortunate, however, than M. Chodat, I observed on my specimens several true sporangia very similar to those of *Hyella cæspitosa.* With regard to the other characters, the normal blue-green or greyish-purple colour of many of the *Myxophyceæ* under certain circumstances becomes rose-purple, as in the variety *purpurea* of *Calothrix confervicola.* The length of the branches in true *Hyella cæspitosa* is very variable, and no reliance can be placed on the shortness of the branches as a specific character. As to the differences in the structure of the sheath they are at most but slight. Although, as I have already stated (*Journ. Bot. l.c.*), I am not prepared to say that *H. voluticola* may not be specifically distinct from *H. cæspitosa*, I prefer, in the present state of our knowledge, to regard it as a well-marked variety of the earlier described species.

3. Spirulina versicolor Cohn in Rabenh. *Fl. Eur. Alg.* vol. ii. p. 292. First noticed by Mr. Brebner on the walls of tanks in the Plymouth Marine Laboratory, but subsequently found by him on the shores of the Barn Pool, forming thin layers on the surface of the mud. Prof. Phillips informs me that he too has found the same species at Bangor.

4. Plectonema Nostocorum Bornet in Born. et Thur. *Notes Algologiques* fasc. ii. p. 137. Endophytic in the gelatinous fronds of *Rivularia bullata*, Torquay, *E. A. B.*

Chlorophyceæ.

5. Ulvella fucicola Rosenv. var. globosa, nov. var. Fronds minute, 90–400 μ in diameter, scattered, solitary or in groups of twos or threes, globose or hemispherical, firm, smooth. Thallus at first monostromatic, finally composed of three, four, or more layers of cells. Cells 15–45 μ long by 7–9 μ wide. Chromatophores and sporangia as in the typical form. Hab.: Epiphytic on the filaments of *Sphacelaria racemosa*, Berwick, *E. A. B.*

At first the fronds of this pretty little epiphyte are disc-shaped and monostromatic, and so like those of *Pringsheimia scutata* that it is not always easy to say to which species a specimen belongs. The centre of the disc, however, soon becomes polystromatic, and the fronds assume a more or less globular form, which is a marked characteristic of the mature plant. These globose, bright grass-green fronds are either solitary or collected into groups of three or four individuals, and are either attached laterally to the filaments of the host-plant, or entirely surround them. The variety differs from the typical form in the thicker, more globular frond, slightly larger cells, and in the basal cells showing no tendency to penetrate between the cells of the host-plant.

6. Epicladia Flustræ Reinke var. Phillipsii, nov. var. Fronds dark grass-green, endozooic in the gelatinous outer coating of *Alcyonidium gelatinosum.* Patches indefinite in outline, confluent, eventually covering the entire surface of the host. Cells of the free filaments cylindrical, much longer than broad, usually 6–18 μ long by 3–9 μ wide, those of the central pseudo-parenchymatous portion of the layer polygonal and nearly isodiametric, 3–12 μ in diameter. Hab.: Bangor, March, 1896, *Prof. R. W. Phillips.*

In this variety the cells of the free filaments are much longer and more slender than in the typical form of the species, and the patches, instead of being small and isolated, are more or less extensive and confluent, finally covering the surface of the host, to the exclusion of everything else, with its dark green fronds. The variety is always either entirely or to a very large extent *endo*zooic, growing immersed in the gelatinous outer coatings of the host. It may be well to say that the typical form is by no means always *epi*zooic, as was at one time supposed, but frequently grows more or less deeply immersed in the substance of the host.

7. Gomontia manxiana Chodat in *Bull. de l'Herb. Boissier* t. v. p. 715. This species, which was found by Dr. Chodat in the exterior layer of shells gathered last year near Castletown, in the Isle of Man, is said to have fronds like those of *Siphonocladus voluticola* Hariot, *i. e.* the branches are not separated from the cells, from which they arise by a basal septum. The characters which separate this species from *Gomontia polyrhiza* Born. et Fl. are the more slender habit, the acute apices of the branches, the swollen joints, and the more slender differently shaped sporangia.

I have frequently gathered at Cumbrae and elsewhere specimens of a *Gomontia* which agrees well with M. Chodat's description of *G. manxiana*, indeed this is the form commonly met with on the west coast of Britain. The shape and size of the sporangia and the form of the apical cells of *Gomontia polyrhiza* are, however, liable to so great variation that they cannot be safely relied on as specific marks, and I am, therefore, inclined to think that *G. manxiana* may, after all, turn out to be nothing more than a form of the very variable *G. polyrhiza.*

Fucoideæ.

8. Phæostroma æquale Kuck. *Bemerk. zur Marin. Algeveg. von Helgoland* ii. p. 385 (*aus Wissenschaftliche Meeresuntersuchungen, herausgegeben von der Kommission zur Untersuchung der Deutschen Meere*, &c., Neue Folge, Band ii. Heft 1). *Streblonema æquale* Oltm. The late Mr. T. H. Buffham was the first to notice this plant, which he described as the plurilocular sporangia of *Chorda filum;* it is only justice to his memory, however, to say that his preparations did not show the endophytic filaments of the parasite, and were in other respects defective, so that his mistake cannot be wondered at. Dr. Oltmann first recognized the plant as a true

parasite, and gave to it the name *Streblonema æquale*. Dr. Kuckuck has recently removed it on account of the peculiar form of the plurilocular sporangia to his genus *Phæostroma*. Specimens of this species are contained in fasc. ix. of Mr. Holmes's *Alg. Exsicc.*

9. PHÆOSTROMA PROSTRATUM Kuck. in *Bot. Zeit.* 1895, p. 185. (*Phæocladia prostrata* Gran. *Algeveg. Tönsbergfjorden.*) I refer to this species a few specimens of a *Phæostroma* which I gathered at Cumbrae in 1891. The fronds are not nearly so much branched as in *P. pustulosum*, and form a much more open layer. The plurilocular sporangia, which are formed, as in *P. pustulosum*, from cells in the continuity of the filaments, are hardly larger than the vegetative cells, and consequently are only very slightly raised above the surface of the layer; they are frequently very numerous, all the cells of a branch being not unfrequently transformed into sporangia.

10. MIKROSYPHAR PORPHYRÆ Kuck. *Bemerk. zur Mar. Algeveg. von Helgoland* ii. *l.c.* p. 381. Folkestone, June, 1896, *E. A. B.* This minute species forms yellowish brown stains, which to the naked eye are not unlike the young fronds of *Myrionema strangulans* on old fronds of *Porphyra laciniata*. The thallus is composed of slender, densely branched, creeping filaments, which are entirely immersed in the substance of the host-plant. The plurilocular sporangia, which differ but little in form and size from the vegetative cells, push their way to the surface of the host-plant, rising slightly above it.

11. MIKROSYPHAR POLYSIPHONIÆ Kuck. *l.c.* p. 381. Berwick, June, 1895, *E. A. B.* This species, which differs but little, except in the size of the cells, from *M. Porphyræ*, is frequently found in the cell-walls of *P. urceolata* and *C. polyspermum;* in general appearance it resembles *Endoderma viridis*, except in colour and, of course, in fructification.

12. **Ectocarpus Microspongium**, nov. spec. Fronds minute, forming yellowish-brown, compact, hemispherical, cushion-like patches about 1 mm. in diameter on the fronds of *Ralfsiæ*. Filaments much branched, irregularly nodose and inextricably matted together below, cylindrical and free above. Branching irregularly dichotomous and spreading below, secund and erect above. Cells 9–15 μ in diameter and 9–12 μ long. Plurilocular sporangia often very numerous, arranged secundly on the upper free branches, oblong-lanceolate in form, 70–105 μ long by 12–15 μ wide, sessile, or borne on very short one- or two-celled stalks. Long colourless hairs present on the upper branches. Hab.: Redding Point and Drake's Island, Plymouth, September, 1896, *Geo. Brebner*.

This interesting species appears to be quite distinct from any described *Ectocarpus*. The minute cushion-like fronds are either isolated or collected into groups, one frond pressing closely against another, but never losing its hemispherical form. To the naked eye the plant exactly resembles *Microspongium gelatinosum*, or very minute specimens of *Petrospongium Berkeleyi*. Sections made through one of these cushions so greatly resemble those of *P.*

Berkeleyi that, were it not for the entire absence of any investing gelatinous substance, one might feel tempted to consider the plant the form of that species bearing plurilocular sporangia. The filaments in the lower portion of the cushion are inextricably interlaced in a manner very similar to that of *Petrospongium;* the cells of the free filaments, however, are cylindrical, not swollen in the middle as in that genus. Hyaline hairs are scattered amongst the erect free filaments. The ultimate ramuli are always secund, and usually more or less closely pressed against the branch from which they arise. The plurilocular sporangia are somewhat like those of *E. confervoides*, but longer, and always terminate in an obtuse point. Like the ultimate ramuli they are very erect, and form a very acute angle with the branch on which they are borne; they are frequently very numerous, most of the ultimate ramuli each bearing three or four sporangia, secundly arranged, and springing from cells contiguous to each other.

13. SPHACELLA SUBTILISSIMA Reinke, in *Berichten der Deutschen Botanischen Gesellschaft*, Band viii. Heft. 7 (1890), p. 206, var. ANGLICA, nov. var. Fronds forming minute tufts on *Ralfsiæ* and *Hildenbrandtiæ*, between the cells of which the lower portion of the filaments penetrate. Vegetative characters like those of the typical form. Unilocular and plurilocular sporangia borne on the same individuals. Plurilocular sporangia cylindrical, slender, terminal or intercalary, hardly broader than the filaments, from which they are formed. Unilocular sporangia as in the typical form. Hab.: Drake's Island, Plymouth, January, 1897, *Geo. Brebner*.

Mr. Brebner's specimens of this plant agree well with Prof. Reinke's description and figures, with the single exception that both plurilocular and unilocular sporangia are borne on the same individuals. In form the plurilocular sporangia, which, I believe, have never before been observed, are very like those of *Leptonema*, and but slightly differentiated from the vegetative cells. After the discharge of the spores, the supporting branch continues its growth through the empty sporangium; this happens in the case both of unilocular and plurilocular sporangia. Mr. Brebner was of opinion that his specimens should be referred to the genus *Ectocarpus* as a new species, but spirit-material, especially the sporangia, show a slight temporary blackening when treated with eau de Javelle, which never happens in the case of any true *Ectocarpus*. This temporary blackening under the influence of eau de Javelle, and the apical growth, point to the plant being one of the *Sphacellariaceæ*, and I am unable to find any character by which it can be specifically separated from Reinke's *Sphacella subtilissima*.

FLORIDEÆ.

14. **Rhodochorton Brebneri**, nov. spec. Primary filaments decumbent, stragglingly branched, the branches usually widely separated from one another, irregularly nodose, about 9 μ in diameter, sunk in the substance of *Glœosiphonia capillaris;* hairs and fertile branches erect, projecting slightly above the surface. Erect branches much and irregularly branched, forming dense

tufts, usually more or less widely separated from each other. Cells from 9–60 μ in length. Tetraspores terminal or lateral, in the latter case borne on short stalks, large in proportion to the size of the plant, solitary or clustered, oval or oblong, from 18–30 μ long, and from 20–30 μ broad. Hab.: Rennie Rocks, Plymouth, June, 1896, *Geo. Brebner.*

This very interesting species gives little outward indication of its presence. It does not appear to injure the host-plant in any way, as the specimens of *Glœosiphonia*, in the fronds of which it was found, were perfectly healthy, and bore antheridia and cystocarps in abundance. The habit of the plant bears a striking resemblance to that of a *Streblonema*. The tetraspores are very large and conspicuous, and clearly cruciately divided. I have dedicated the species to its discoverer, Mr. Geo. Brebner, who has done excellent service to British algology.

15. HARVEYELLA PACHYDERMA (*Choreocolax pachydermus* Reinsch, *Contrib. ad Algol. et Fungol.* tab. 50). In the recently issued fasciculus of his *Algæ exsiccatæ*, Mr. Holmes has distributed specimens of a *Harveyella* collected at Gosport in December of last year by Mr. H. N. Sturch. These specimens were supposed, both by Mr. Holmes and myself, to belong to Kuckuck's *Choreocolax albus*, which, however, turns out to be only the tetrasporic form of *Harveyella mirabilis.* Mr. Sturch's specimens, which bear both cystocarps and tetraspores, appear to be referable to Reinsch's *Choreocolax pachydermus*, which was also found parasitic on the fronds of *Gracilaria confervoides*, rather than to his *C. mirabilis.*

16. CORALLINA VIRGATA Zan. *Sagg. di Class. Nat. d. Ficee*, p. 42. Bangor, Ireland. Mrs. Barwell Carter, a daughter of the late Dr. Geo. Johnston, of Berwick-on-Tweed, recently very kindly presented me with a small collection of "British Lithophytes" which had belonged to her father; amongst them were two specimens of the present species from "Bangor, Ireland," marked in Dr. Johnston's writing "*Corallina officinalis*, var."

17. MELOBESIA MYRIOCARPA Crouan, *Flor. du Finist.* p. 150. Plymouth, *E. A. B.;* Weymouth, *E. M. Holmes.* Specimens of this species have been distributed by Mr. Holmes in his *Algæ exsiccatæ.* I first detected this species on pieces of glass, &c., dredged from 5 to 8 fathom water in Plymouth Sound. My specimens agree well with Crouan's description, as do those distributed by Mr. Holmes, but it is quite possible that the plant may have previously been described under some other name, as it is almost impossible to recognize some of Kutzing's species from his descriptions.

18. HILDENBRANDTIA CROUANI J. Ag. *Spec. Alg.* vol. ii. p. 495. (*Hildenbrandtia rosea* Crouan, *Fl. Finist.* p. 148, tab. 19, gen. 126.) Teignmouth, *T. H. Buffham;* Berwick, *E. A. B.* Prof. J. G. Agardh divides the genus *Hildenbrandtia* into three sections or subgenera, the first—*Hildenbrandtia* proper—is characterized by the irregularly divided tetraspores, which vary in form from regularly cruciate to regularly zonate; the second sub-genus—*Hæmatophlœa*—is characterized by the regularly zonate tetraspores; the third

subgenus—*Erythroclathrus*—is said to be distinguished by the presence of paraphyses, but probably empty sporangia have been mistaken for these organs. The present species belongs to the second subgenus, and is distinguished by its thin, brownish fronds and slender, spindle-shaped, regularly zonate tetraspores. Under the name *H. rubra*, the brothers Crouan sent specimens belonging to more than one undescribed species to Prof. J. Agardh, who named and described them. The Crouans, however, seem to have failed to recognize the plants from Agardh's descriptions, and much confusion has arisen owing to their having applied the Agardhian names to species which Agardh did not intend to indicate by them. That I might not add to the confusion, I sent specimens and microscopic preparations to Prof. Agardh, and requested him to compare them with his type specimens; this he has most kindly done. Dr. Bornet has also been good enough to compare British specimens of *Hæmatophlœa Crouani* Crn. (non J. Ag.) with authentic specimens. I am therefore in a position to clear away some of the doubts surrounding this species. *Hildenbrandtia* (*Hæmatophlœa*) *Crouani* J. Ag. is identical with *H. rosea* Crn. *Fl. Finist.* p. 148, tab. 19, gen. 126, while *Hæmatophlœa Crouani* Crn. *Ann. Sc. Nat.* 4 ser. Bot. vol. ix. pl. 3, fig. 6, *a b c*, is *Hæmatocelis rubens* J. Ag. *Spec. Alg.* vol. ii. p. 497, which is thus recorded under two different names in the *Florule du Finistère*. It may be useful to point out that Hauck's description (*Meeresalg.* p. 38) of the tetraspores of *H. prototypus* Nardo was most probably drawn up from a specimen of *H. Crouani*, Hauck having mistaken the true (irregularly divided) tetraspores of *H. prototypus* for carpospores. The late Dr. F. Schmitz informed me, in conversation, that Dr. Hauck had no authority for saying that he (Dr. S.) had seen the cystocarps of any species of *Hildenbrandtia*, which so far as he knew were quite unknown.

Porphyrodiscus, nov. gen. Fronds crustaceous, forming smooth, firm, cartilaginous, roundish expansions, closely adhering to the substratum by the entire under surface. Cells small, of nearly the same size in all parts of the frond, firmly united into a pseudo-parenchymatous layer. Tetraspores regularly zonate, formed in external, hemispherical or flat wart-like protuberances (nemathecia). Paraphyses wanting or not observed. Cystocarps unknown.

19. **P. simulans,** nov. spec. Fronds dark shining purplish-red, roundish, about 1 inch in diameter, and from 150–300 μ thick. Cells small, about as long as broad, 4–6 μ wide. Nemathecia hemispherical or flat, from 150–300 μ in breadth. Tetraspores slender, spindle-shaped, regularly zonate, 20–25 μ long by 5–8 μ wide. Hab.: On rocks near low-water mark, Berwick, February, 1889, *E. A. B.*

To the naked eye this species resembles dark-coloured specimens of *Hildenbrandtia prototypus;* but the tetraspores, instead of being contained in cavities sunk beneath the surface of the frond and entirely enclosed, with the exception of a minute pore communicating with the surface, as in the genus *Hildenbrandtia*, are formed in external hemispherical or flat nemathecia, surrounded by a more or less evident, clear, hyaline, gelatinous substance. These nemathecia, which are sometimes of considerable size, seem to contain only tetraspores, which are formed from the apical cells of the thallus-filaments. It is possible that after the discharge of the spores, a fresh sporangium is formed within the old empty one. Sporangia of all ages occur in the same nemathecium ; the young undivided, and the empty sporangia somewhat resembling unicellular paraphyses. The genus *Porphyrodiscus* forms a link between the genera *Hildenbrandtia* and *Hæmatocelis ;* from the former it is distinguished by the external nemathecia, and from the latter by the absence of paraphyses, and the much more prominent nemathecia. In *Hæmatocelis*, indeed, the tetraspores may be said to be imbedded in the superficial layer of the frond rather than in external nemathecia. They are, moreover, always accompanied by multicellular filaments (paraphyses or unaltered thallus-filaments).

I cannot close this note without referring to the lamented death of my friend Mr. George William Traill, of Edinburgh, which took place at his residence in Joppa, Midlothian, on Wednesday, the 7th of April of the present year. By his death a blank is left in the ranks of British algologists which it will be hard to fill. Really good collectors are now so scarce that we can ill afford to lose such an accurate and painstaking observer as Mr. Traill. For more than twenty years much of his spare time was devoted to collecting and classifying the British marine algæ, more especially those of Orkney, his native place, and of the Firth of Forth, on the shores of which he had so long resided. Always ready to assist other workers in the same field, much of Mr. Traill's collecting was undertaken to supply the wants of algologists living at a distance from the sea, and but a small proportion of the specimens he gathered are now contained in his herbarium. Never strong for years before his death, he had to contend with chronic ill-health, and it is marvellous how he managed to do so much and such useful work. The following is a list of the published papers on algological subjects written by Mr. Traill :—

1. An Alphabetical List of the Parasitic Algæ of the Firth of Forth (*Proc. Royal Dublin Soc.* 1882).
2. The Marine Algæ of Joppa (*Trans. Bot. Soc. Ed.* 1886).
3. A Monograph of the Algæ of the Firth of Forth. 1885.
4. The Marine Algæ of Elie (*Trans. Bot. Soc. Ed.* 1888).
5. The Marine Algæ of the Orkney Islands (*l. c.* 1890).
6. Notes on New and Rare Algæ (*l. c.* 1888).
7. The Marine Algæ of the Dunbar Coast (*l. c.* 1890).
8. On the Fructification of *Sphacelaria radicans* (*l. c.* 1888).
9. Supplementary Notes on the Marine Algæ of the Orkney Islands (*l. c.* 1892).
10. Supplementary Notes on the Marine Algæ of the Orkney Islands: (2) Island of N. Ronaldsay (*l. c.* 1895).

Most of these papers were illustrated with herbarium specimens of the rarer species.

SYMBIOSIS BETWEEN AN ASCLEPIAS AND A BUTTERFLY.*

By E. Ule.

In whatever fields and pastures in Brazil *Asclepias curassavica* L. is found, there is to be seen either a large red-brown spotted butterfly flying about near it or at least some of the caterpillars on the plant. Inversely, to find the butterfly argues the proximity of the plant. This butterfly is *Danais Euripus*, a large species (surpassing in width from wing to wing the German species of *Vanessa*), which is developed almost the whole year round and flies away with difficulty.

It is well known that many butterflies are confined to special plants for their food, and are always to be found at certain times in their neighbourhood; but such a marked and constant connection as this is not known to me at all in the case of any other large butterfly. Feeling sure that this occurrence must have a special cause, I made observations, and remarked that *Danais Euripus* is the principal fertilizing agent of *Asclepias curassavica* L.† Some other butterfly may now and again fly to the blossoms of this Asclepiad, or wasps may settle upon it, but none of these insects are such constant and specialized visitors as *D. Euripus.* When it settles on an umbel to sip the nectar, it generally runs its legs into the flower by its somewhat clumsy movements, and drags out the pollinia. All the specimens which I caught had their legs more or less covered with sticky attachments and lumps of pollen. Sometimes I recognized pollinia which had been pushed in, and in one flower there were as many as three pollinia with their attachments pressed into the slit, while above, in the anther-pocket, there still remained the original pollinium.

The butterfly very seldom pays even a single visit to the flowers of another plant; as a rule, it is only to be seen on *Asclepias curassavica* L., scorning all other nectariferous flowers in the neighbourhood. In one field where this Asclepiad was plentiful there were other butterflies, but these visited more the flowers of a *Hyptis* and *Crotalaria.* Whenever they did go to the *Asclepias* flowers, they became covered with pollinia, as did also a large wasp (*Polistes canadensis* L.) which was common there. More delicate and less clumsy insects did not become thus covered.

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* [Translated from *Berichte der Deutschen Bot. Gesellschaft* xv. 385–7 (7 Sept. 1897). Dr. Buchanan White's paper, referred to in the first footnote, was published in this Journal for 1873, pp. 11–13.—Ed. Journ. Bot.]

† According to communications of B. White (Bot. Jahresb. 1873, p. 378), species of the genus *Dianthœcia* of Noctuidæ fertilize those species of *Lychnis* and *Silene* in whose capsules live the caterpillars of the said butterflies. The same investigator takes for granted a mutual dependence in the geographical distribution of *Sphinx Convolvuli* and *Convolvulus sepium.* In the latter case, however, it is to be noticed that the caterpillar of *Sphinx Convolvuli* occurs principally on *Convolvulus arvensis.* On the other hand, the case of the so-called Yucca moth (*Pronuba Yuccasella*) and the smaller Lepidoptera shows a mutual dependence not less genuine than in our *Asclepias* butterfly.

It is also remarkable that *Danais Euripus* has followed the wanderings of the *Asclepias*, which has spread from America over the warmer parts of the globe. Whether this following is complete, or whether the butterfly has not yet penetrated to some places, and other insects suffice for fertilization, I am unable to determine from the literature at my disposal. As shown above, fertilization by means of other insects is not an impossibility, but it is not so constant; therefore *Danais Euripus* plays at any rate the most important part in the proceeding, and certainly is always to be found wherever *Asclepias curassavica* grows in America. In most flowers which are specialized for certain visitors, *viz.* humming-birds, Sphingidæ, and humble-bees, chance fertilization occurs through quite different agents. In South Brazil this same butterfly lives also on *Asclepias campestris* Decne. (regarded by Grisebach as *A. curassavica* L.), and another variety is also said to be found there.

The Asclepiad gives therefore board and lodging to the butterfly in its caterpillar state, and when the insect is developed, the plant, while refreshing it with sweet nectar, protects it also from enemies; for the wings of the butterfly, when spread out, resemble in colour* the umbel in bloom, and when folded those in bud.

In return for this service *Danais* fertilizes the *Asclepias*, and in this way multiplies and supports it. It may be mentioned that the caterpillars are much scattered, and seldom do much damage to the plants, which are avoided as poisonous by grazing animals. Such a mutual and constant association of insect and plant is certainly worthy of notice, and may be best compared with that of ants and *Cecropia*. I will add an observation which may throw light on this latter connection.

In the swamp near Mouá, especially at the edge of the Restinga, where Sphagnum is often found, there grows plentifully a dwarf *Cecropia* rough with hairs, which often attains a height of one or two metres; on this I have always found a great number of ants. To my surprise I found one day in the cold season all the *Cecropiæ* free from ants, a circumstance which I examined into more closely, and to this end cut open the stem. There I found in each of the upper chambers (internodes) a large wingless female. From this it would appear that all the working ants die off at certain times (whether the species be peculiar to the swamp species of *Cecropia*, or not, remains an open question), and the females then found new colonies, resembling in this way the wasps in Germany.

In connection with this may be mentioned the case brought forward by Alfred Möller (Bot. Mitth. a. d. Tropen, Heft 6, s. 82) that ants do visit *Cecropia*. It is a fact, then, that young *Cecropiæ* (I once found a single female at the internode), and sometimes the older ones, at least for several weeks at a time, are free from ants. It appears that here also it is only a case of living together for mutual benefit, interesting enough in itself, but not an absolute dependence on both sides. In this latter wide sense I accept the meaning of the word symbiosis. More detailed information can only be obtained by a close study of ant life, which would enter too much into the region of zoology to be introduced here.

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* I am inclined to think that the gay colour of the butterfly has arisen partly from imitation of the flowers which it visits, in order to escape thereby from its pursuers. The likeness between night-moths and rocks, bark and lichen, as well as the resemblance of stationary day-moths and caterpillars to leaves (so-called mimicry) is well known. In the same way the bright colour of many butterflies has arisen in imitation of flowers, although, on the other hand, much fine colouration cannot be explained that way, but must be regarded as a kind of luxury.

SOME SCOTCH WILLOW HYBRIDS.

By W. R. Linton, M.A.

S. phylicifolia × repens. By the side of the Corriemulzie Stream, Braemar, S. Aberdeen, July 31, 1897. A low creeping bush spreading over about a square yard or so in the turf, and sending up branches about six inches high, which are much hidden in the herbage; leaves small, glaucous underneath, and with more or less revolute margins. One withered catkin was noticed, showing the plant to be female. This is, as far as I can find, the first discovery of the hybrid for Britain; and neither Andersson nor Wimmer appears to know of a native station for it. It is familiar as a cultivated plant under the name of *S. bicolor*.

S. Lapponum × phylicifolia. Gathered in 1890 at the head of Glen Doll, Forfarshire, and commented on in the *B. E. C. Report* for that year by Dr. F. B. White. After being cultivated at Shirley for some years, the shape, reticulation and entire margin of the leaves, and the character of the catkins suggested the idea of *S. Lapponum* as the element which had combined in it with *S. phylicifolia*. This is corroborated by the fact that Rev. E. F. Linton has produced at Bournemouth an exactly similar plant by crossing the above two species.

S. Arbuscula × herbacea. In addition to the localities mentioned in Dr. White's *Revision*, I have this hybrid from Corrie Ardran, Mid Perth, whence I brought a seedling plant of it in 1891. The catkins are very close to those of *S. Arbuscula*, the leaves as definitely favour *S. herbacea*.

S. herbacea × nigricans. Glen Fiagh, Clova, Forfarshire, July, 1891. The tendency of the leaves to blacken in drying, the strong pubescence of the under side of the young leaves, and the glaucous green of the mature leaves, the broad brown catkin-scales, dilated nectary, long pedicel and style, point to *S. nigricans* as the element which has been combined with *S. herbacea*.

ALIENS FROM TURKISH BARLEY.

By S. T. Dunn, B.A., F.L.S.

For some years past I have been puzzled to account for the frequent occurrence of certain alien plants, such as *Medicago scutellata* and *Melilotus parviflora*, in the neighbourhood of Bath, but recently the problem has been, at any rate partially, solved by the discovery of these and many other introductions associated together under circumstances that left no doubt about their origin. The colony was growing in an old quarry at Twerton, a mile or two from Bath, to which my attention had been drawn earlier in the year by a quantity of *Lepidium Draba*. On returning there in September I found about a hundred species evidently introduced and extending in patches over about two acres of the flat grassy floor of the disused part of the quarry. Some of the patches appeared to be quite new, others must have lasted two or three years, while one, consisting almost wholly of leguminous plants growing freely in the native turf, must have been older still. Out of all the species seen, most were fruiting well, and only a few in the newest patches were evidently unable to ripen seed. Some of those first determined pointed to an eastern origin, and I was not surprised to find, after considerable enquiry, that a certain maltster was in the habit of carting his barley-siftings out to Twerton Quarry, and also that he had since 1890 been using barley from Asiatic Turkey.

Several facts point to our Turkish barley trade as likely to be responsible for a large number of alien plants in Britain. In the first place, an immense quantity of this cereal is shipped to England and Scotland from ports of Asia Minor and the Levant: the average for the last five years has been over 3,000,000 cwt. annually. Owing, moreover, to the careless growing and thrashing of the crops, there is an unusual amount of seeds of cornfield weeds with the grain; in two handfuls from Ouchak I have seen as many as twenty or thirty. All these have to be sifted out before malting, and they are subsequently thrown away upon waste ground or sold for feeding chickens, &c. The first way of disposing of them would account for such colonies as those at Wandsworth (see Brewer's *Flora of Surrey*, pp. 313–318 (1863)) and at Twerton, while from the latter would result the records of single aliens scattered on commons and by roadsides.

Below is appended a list of all such of the Twerton aliens as could be identified from material collected in September, including also native species where these have undoubtedly come with the siftings. Most have been compared with authentic specimens in the British Museum Herbarium. The list will be found to correspond to some extent with Wandsworth aliens, which indeed probably came from the same quarter, for they were mostly Mediterranean species, and Asiatic Turkey was, of all Mediterranean countries, the largest exporter of Barley to England at the time the list was compiled.

Ranunculus muricatus _L._
Alyssum hirsutum _Bieb._
Thlaspi arvense _L._
Malcolmia africana _R. Br._
Sisymbrium Columnæ _Jacq._
S. Sophia _L._
Camelina sativa _Crantz._
†Lepidium Draba _L._
Brassica Rapa _L._
*Erucastrum incanum _Koch._
Diplotaxis tenuifolia _DC._
*Eruca sativa _L._
Rapistrum perenne _All._
*R. rugosum _All._
R. Linneanum _Boiss._
Saponaria Vaccaria _L._
Silene inflata _L._
S. quinquevulnera _L._
*Malva parviflora _L._
M. verticillata _L._
Lupinus angustifolius _Des._
Medicago sativa _L._
†M. scutellata _All._
†M. tribuloides _Lam._
†M. maculata _Willd._
†*M. denticulata _Willd._
†M. laciniata _All._
†M. pentacycla _DC._
†M. apiculata _Willd._
†*Trigonella cærulea _Ser._
T. Noeana _Boiss._
†*Melilotus parviflora _Desf._
M. arvensis _Wallr._
†Trifolium ochroleucum _L._
†T. Armenium _Willd._
†T. Cherleri _L._
†T. Alexandrinum _L._
*†T. resupinatum _L._
†T. spumosum _L._
T. elegans _Sav._
†Vicia narbonensis _L._
†V. angustifolia _Roth._
†V. lutea _L._
*†V. varia _Host._
†V. bithynica _L._
†Lathyrus Aphaca _L._
†L. sativus _L._
Ornithopus compressus _L._
Herniaria hirsuta _L._
*Caucalis daucoides L.
Scandix Pecten L.
Asperula arvensis _L._
Galium tricorne _With._
G. Vaillantii _DC._
Cephalaria syriaca _L._
Asteriscus aquaticus _L._
Anthemis tinctoria _L._
Chrysanthemum segetum _L._
*C. coronarium _L._
Centaurea solstitialis _L._
Cnicus setosus L.
C. benedictus _L._
Rodigia commutata _Spr._
Picris pilosa _Del._
Crepis fœtida _L._
Anchusa strigosa _Lab._
Lithospermum arvense _L._
Echinospermum Lappula _Lehm._
*Asperugo procumbens _L._
Scrophularia Ehrharti _Stev._
Salvia verticillata _L._
S. Horminum _L._
Sideritis montana _L._
*†Plantago Lagopus _L._
Chenopodium Vulvaria _L._
*Phalaris minor _Retz._
*P. paradoxa _L._
Alopecurus agrestis _L._
Panicum Crus-galli _L._
Polypogon monspeliense _Desf._
Poa compressa _L._
*Cynosurus echinatus _L._
Bromus arvensis _L._
B. brachystachys _Horn._
B. patulus _Parl._
B. squarrosus _L._
B. unioloides
Lolium temulentum _L._
Hordeum murinum _L._

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* Plentiful. † Apparently established for several years.

POTAMOGETON TRICHOIDES Cham. in CAMBRIDGESHIRE.

By Alfred Fryer.

This species grows in the parish of Mepal, District 7 of Babington's *Flora of Cambridgeshire;* it occurs in one of the old natural effluents of the now dried-up "West-Water," a former branch of the River Ouse. With the exception of a single plant, the species seems confined to a space of about a hundred yards on each side of the bridge which carries "Ireton's Way" across that part of the Sutton and Mepal Drain called "The Old Eau." I am thus exact in giving the precise locality of the plant because I think this peculiar distribution indicates that it is an old inhabitant of our district, and not recently brought to us by water let in from the rivers which run to Lynn, its West Norfolk station.

When there is a deficiency of water in the summer, a small sluice by the side of the old Bedford River near Welches Dam lets in a sufficient supply, and as occasionally the old Bedford itself is nearly dry, the tidal water from the New Bedford River is let into it, in turn, and so we get the products of the lower waters brought up to the fens thirty miles inland.

I have long expected for this reason to find *P. trichoides* in the ditches by the rivers or drains at Welches Dam, and have repeatedly looked for it as far in that direction as Welney, in West Norfolk, but hitherto without success.

To return to the Old Eau:—Although I plumed myself not a little on having found a rare species in a district where I had predicted its occurrence as theoretically probable, I thought it necessary to test the theory by carefully searching the drain from Ireton's Way to the Sutton and Mepal Engine, where the water when let in from the Old Bedford River first joins the main drain, and thence runs up to the Old Eau. To my surprise, no trace of the species occurred for half a mile, or more, and then a single plant only was found; beyond this plant I could not find a trace of the species; so it seemed as if this single plant had been brought down from the Old Eau, rather than had ascended the drain to its present station in that water.

It is not improbable that when the tidal waters flowed up these old natural streams, such as the old crooked Eau was at one time, *P. trichoides* was more abundantly and widely distributed in the fens. Evidently it now lacks some favourable condition necessary to its growth, for its innumerable winter-buds are so freely produced that a single plant might stock miles of river or drain in a single season. It seems quite able to contend successfully with its fellow-denizens of the drains; as it grows freely amongst the densest masses of *Potamogeton*, it evidently is not crowded out, as it prefers to grow where vegetation is thickest. Unsuitable soil, moreover, can hardly be the reason for its restriction, because the greater part of the fens between Mepal and its West Norfolk station are on the "silt," an ancient estuary deposit on which it grows near Lynn. Possibly there is something in the nature of the water which does not suit the species, and so limits its distribution in much of the intervening space. Practically I find it impossible to grow certain species of pond-weeds—*P. polygonifolius*, for example; they linger for a time and then die away, and these are just the species which we ought to find in our fenland, but do not!

Cambridgeshire now possesses twenty-two of the twenty-eight species of *Potamogeton* listed in the last edition of the *London Catalogue*, but one of them, *P. alpinus*, needs confirmation by actual specimens. Prof. Babington had none in his herbarium, nor could he find any among the older collections in the University Herbarium. Burwell Fen has been repeatedly searched for *alpinus* without success: was a rufous form of *P. coloratus*, which grows there, mistaken for it?

The discovery of *P. trichoides* in a drain which I had repeatedly searched for years, and where I must have repeatedly seen the species, is another proof of the difficulty of making a complete list of the plants of even a small district. No doubt I had passed it over as a *Zannichellia*, which genus it much resembles in appearance when growing amongst other plants. At the first glance I thought that it was *Z. palustris*, which swarms in the fen ditches and drains, but thought it just worth a closer examination; following up the clue thus obtained, I found every plant of the kind I had passed by for about a hundred yards was *P. trichoides!* I mention this because it may assist botanists to find the species in other localities in the fens.

As far as I have been able to observe, the plant is not strictly monogynous (see Crépin, *La Flore Belge Etudiée par Fragments*, fasc. 4, pp. 47–8), but only a single fruit seems to be perfected. Although the stem and foliage are slender and delicate, the plant in deep water attains a length of 6–8 ft. The lower part of the stem is certainly compressed, the upper part almost terete, two branches are frequently produced in the axils of the leaves, and late in the autumn very numerous axillary winter buds are formed, by which the plant is more frequently propagated than by seeds. Owing to the "roading" of the drain, I have not been able to obtain perfect fruit, but the immature examples are sharply keeled with the keel regularly tubercled, so as to appear crenulate in the more immature examples. Mr. Bennett, to whom I sent the first-formed fruit, concurs with me in the identification of the species.

MYCOLOGIC FLORA OF KEW GARDENS.*

The area of the Royal Gardens is a little more than 250 acres. If some adjacent pieces of Royal property are thrown in, the total is some 300 acres, or nearly half a square mile. Taken with the Old Deer Park to the south, the whole space is singularly isolated, bounded as it is on three sides by the bend of the river sweeping round from Kew to Richmond, and on the other by the high road between these two places.

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* From the *Bulletin of Miscellaneous Information* for April [August], 1897, where a full list of the species is given by Mr. George Massee.

Of the Royal Gardens themselves some hundred acres is little disturbed by any kind of cultivation, and it has certainly remained so for at least a century and a half. Some portions may never possibly have been subjected to cultivation at all. It is not surprising therefore that in the background of horticultural treatment there still subsists a wild fauna and flora of no inconsiderable dimensions. This, as opportunity offers, it is proposed to work out and catalogue from time to time. Mr. G. Nicholson, A.L.S., the present Curator, enumerated the flowering plants occurring spontaneously in the *Journal of Botany* for 1875. A striking peculiarity of this list "is the very small number of naturalized exotics." In the case of Fungi the case is very different.

The enumeration of 337 genera and 1340 species illustrates the richness of the Mycologic Flora of the Royal Gardens, which far surpasses in point of numbers, as also in the variety of rare and interesting species, any other record for an equal area. This is only perhaps what would be expected, when the large annual influx of plants to Kew from all quarters of the globe is taken into consideration. By this means microscopic fungi, parasitic or saprophytic on plants, are introduced in a living condition on the various hosts, whereas the higher forms belonging to the *Agaricineæ* and the Gastromycetes are usually introduced along with soil, or frequently on the trunks of tree-ferns, either in the form of spores, or in an undeveloped condition. It is worthy of note that the *Polyporeæ* and *Thelephoreæ*, so abundant in tropical regions, are absent from the list as introduced species.

As illustrative of the exotic element may be mentioned *Hiatula Wynniæ* Berk. & Broome, first described (*Ann. Mag. Nat. Hist.* 1879, 206) from specimens found in a stove in the Gardens; this species has recently been received from the neighbourhood of Brisbane, where it is not uncommon, and said to be luminous, emitting a pale green light. It is figured by Cooke (*Illustr. Brit. Fung.* pl. 688). *Flammula purpurata* Cke. & Mass., a very beautiful fungus, was established (*Grevillea*, xviii. 73) from specimens growing on the trunk of a tree-fern in one of the fern-houses, and has since been received from New Zealand, its undoubted home. *Aseröe rubra* Labill., the most beautiful of the many quaint forms belonging to the Gasteromycetes, a native of Queensland, also occurred in a stove some time previous to the year 1867; the specimens are at present in the Herbarium. The genus *Chitonia*, including only four known species, is represented by *C. rubriceps* Cke. & Mass. (*Grevillea*, xv. 57 [65]), found on soil in the Aroid House, but although a typical member of an exotic genus, no clue as to its native habitat has yet been obtained.

Coming to microscopic forms, we find that the list contains a still greater percentage of introduced species, *i. e.* species new to the British list, and growing on exotic plants. The genus *Phoma* heads the list with 107 species, of which above three-fourths have been met with only at Kew, so far as the British Isles are concerned, and of these above thirty were first established from Kew material by Dr. Cooke, who paid special attention to this genus. Not a single example, however, of a parasitic fungus, that has proved to be destructive to plants, has been introduced to Europe through Kew.

The indigenous species of fungi belonging to the *Agaricineæ*—probably due to a great extent to the absence of cattle in the grounds—are fewer than would be expected, with the following notable exceptions. In the genus *Russula* fifty-two species have been observed during the last ten years, out of a total of sixty-one British species. The large size and brilliant colouring of most species belonging to this genus render them very conspicuous objects in the Arboretum during late summer and early autumn. Another genus containing species of sufficient size and brilliancy of colour to attract popular attention is *Boletus*, which numbers twenty-six species. A fairly good collection of specimens of fungi, along with models and drawings, are exhibited in No. 2 Museum.

SHORT NOTES.

Rosa sepium Thuill. (R. agrestis Savi) in Oxfordshire.—In my *Flora* of the county I recorded this plant on the authority of the late Mr. W. Baxter, who found it on the Leys about a mile E. by N. from Upper Heyford (see Walker's *Flora*, 1834). The locality was examined by me on two occasions, but I was unable to find the rose, as the Leys was then under cultivation; the ground has, however, now regained something of its original character, and in 1894 Mr. Bertram Savile Ogle discovered several bushes of *R. sepium* agreeing with Baxter's specimen, which we have still growing in the Oxford Botanical Garden. Subsequently the Rev. W. Moyle Rogers found two bushes near Beckley, and Sister Jane Frances found the same rose in the hedge between Islip and Oddington. This August I found a fine bush on the chalk escarpment near Pyrton, which considerably extends the southern range of the species in the county.—G. Claridge Druce.

Plants of Bedfordshire.—In Aspley Woods I have noticed *Rubus pyramidalis* and *R. pulcherrimus*, and by the stream forming the county boundary which issues at the base of the chalk escarpment between Eddlesborough and Dunstable true *Carex flava* occurs in fine condition. By a mill near Leighton Buzzard some specimens of *Brassica elongata* were seen. Near Leighton I have also found *Hieracium sciaphilum* and *Sparganium neglectum*.—G. Claridge Druce.

Coronilla varia L. in Kent.—Mr. H. F. Plumptre has recently sent me a specimen of this plant from near Goodneston Park, Dover, where he has noticed it for the last three or four years at least, growing in a rough wood on the chalk. He can assign no reason for its introduction, unless it came with some young larch trees.—G. Claridge Druce.

Leersia oryzoides Sw. in Dorset.—Another rare plant has been added to the flora of Dorset by Mr. William Mitten, who a few years ago discovered *Empetrum nigrum* L. on the heathland near Littlesea, and now has detected *Leersia oryzoides* Sw. in a marsh ditch at Wareham. This species, though found in all the neighbouring continental countries (Denmark, Germany, Holland, Belgium, France), is singularly limited in Britain, and has hitherto been believed to occur only in Hants South, Sussex West, and Surrey. It may, however, have escaped notice elsewhere than in Dorset; for, though it can be distinguished at sight by its yellowish green hue and the cylindric, inflated upper part of the stem, A. Braun's epithet (*Oryza clandestina*) was well justified by the habit of a plant whose flowers are usually included in the uppermost sheath, and only come when most grasses are over for the season.—Edward F. Linton.

Carex chordorrhiza Ehrhart in Britain. — On August 4th we were examining some low-lying ground near the head of Loch Naver, at Altnaharra, W. Sutherland, when we came upon a spongy, sphagnous bog, producing *C. limosa* L. plentifully. With it was a sedge which we had not met with before; on comparison with book-descriptions, it seemed to agree well with *C. chordorrhiza*, and Mr. Arthur Bennett has kindly sent us specimens from Lyngby Mose, near Copenhagen, which are evidently the same thing. This is new to the national flora.—Edward S. Marshall & W. A. Shoolbred.

Berwickshire Rubi and Rosæ. — On Aug. 28th I collected the following within half a mile of the bridge over the Tweed at Berwick, in Dist. 81 of *Topographical Botany*:—*Rubus dumetorum* Wh. & N., var. a. *ferox** Weihe. — *R. corylifolius** Sm. — *Rosa mollis** Sm. (type), and var. b. *cærulea** Woods. — *R. tomentosa* Sm. (type), and vars. b. *subglobosa* (Sm.) and d. *scabriuscula* (Sm.).—*R. involuta* Sm. — *R. rubiginosa* L. — *R. canina* L., var. e. *dumalis* (Bechst.).— *R. glauca* Vill. (type), and var. g. *Watsoni* Baker. For the naming my father is responsible.—F. A. Rogers.

NOTICES OF BOOKS.

"Miscellaneous Information."

Royal Gardens, Kew. Bulletin of Miscellaneous Information. Nos. 122–123, "February and March" [issued in August]; No. 124, "April" [August]; Nos. 125–126, "May and June" [August]; No. 127, "July" [August]; Nos. 128–129, "August and September" [September]. "October" [September]. London: Eyre and Spottiswoode.

The inquiry in the House of Commons on June 28 seems to have given a fillip to the flagging energy which directs the Kew *Bulletin*, and the last two months have seen the issue of the above numbers, all of which, according to custom, bear a false date both on cover and title. The number for December, 1896, also appeared in August, and contains the statement that "an absolutely regular monthly issue . . . has been approached as nearly as circumstances would allow"—which shows how great is the force of "circumstances," seeing that even Kew is unable to cope with it. This number is mainly occupied with a general index to the first ten volumes (1887-96), which, by an extraordinary blunder, is stated on the cover to be for "1897-98"! The index would have been more useful if it had contained some reference to the numerous corrections of names which have appeared in these pages and elsewhere.

The issue of this December number enables us to give a list of the actual dates[*] at which the numbers for 1896 were published, as noted in the Stationery Office imprint on each; by this means the mischief caused by the erroneous dating may to some extent be neutralized:—

Date on wrapper and front page.	Date of issue.
January, 1896.	January, 1896.
February.	March.
March. April.	August.
May. June.	October.
July. August.	October.
September. October.	October.
November.	October.
December.	August, 1897.

The contents of this year's numbers amply justify the title of the *Bulletin* to be a purveyor of "miscellaneous information." There are many reprints from various sources, and of all degrees of value—or of none, for it is impossible to regard a "popular" and inaccurate account of the spindle-tree, reprinted from the *St. James's Gazette*, as worthy of preservation in the pages of a Government publication. Prefaces to various Kew works are also included, with extracts from official reports and correspondence, the latter in the most unabbreviated form. Occasionally quotations are given from back numbers of the *Bulletin* itself! and from this and other indications we are inclined to think that the irregularity of publication is due as much to deficiency of matter as to want of method.

Conspicuous amid the *omnium gatherum* are two papers of some botanical importance. One, Mr. Massee's "Mycologic Flora of the Royal Gardens," will be especially interesting to British botanists, who may be inclined to regret that it appears in so out-of-the-way a medium of communication. Still, they can get it for 4d.—it is in the "April" number—and we reprint elsewhere the introductory summary, the literary style of which leaves much to be desired: it is accompanied by two roughly drawn plates. In some cases—*e. g.* under *Chitonia* (pp. 116-128)—the same error of quotation occurs that appears in Cooke's *British Fungi*. Mr. Massee, we observe, retains the name *Myxogastres*, and makes no reference to Mr. Lister's revision of the group.

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[*] We hope that Dr. Britton will not, as on a former occasion (see p. 64), mistake the above list of dates for those of the *Bulletin of the Torrey Club.* We have not observed that Dr. Britton has published any correction of his error, on the strength of which he rebuked us somewhat severely. It appears to us that when a man has made a mistake, the right course is to own up, and, if necessary, to apologise—but this is probably an old-fashioned view.

The other paper will interest those who pay special attention to African botany; it is another instalment of the "Diagnoses Africanæ," and contains nearly two hundred descriptions of new or newly-named species; it occupies the double number for August–September, which dates from the latter month. A large proportion of the novelties are from the collections made by Mr. Alexander Whyte in North Nyasaland. Mr. Whyte's previous collections were sent to the British Museum, where they were worked out, the novelties having been published in Trans. Linn. Soc. 2nd S. iv. 1–68: we presume there was some reason, not apparent on the face of it, why these later gatherings found another destination. Others are from Central Madagascar, collected by Dr. Forsyth Major; from Angola (Welwitsch); East Africa (Elliot and Volkens—misspelt "Volckens"); Cameroons (Bates); Central Africa (Kirk): among the grasses several plants from the older collectors are taken up by Dr. Stapf, who is responsible for this part of the work.

Many of the species belong to large genera, and it is to be hoped that due care has been taken in establishing them. Some fear, however, may be expressed on this head, and is justified by the treatment which has been meted out to the Welwitsch plants, not only on this but on former occasions.* Whyte's plants have not, so far as we know, been distributed, and it is not possible to express any opinion as to the value of the species based upon them; but Welwitsch's are widely spread, and it is to be regretted that Mr. Baker has not noticed that some of his novelties have already been published by other botanists. *Hermstaedtia* [*Hermbstaedtia*] *Welwitschii* Baker, for example, based on Welwitsch 6502, has been anticipated by *H. argenteiformis* Schinz in Verhandl. Bot. Ver. Prov. Brandenburg, xxxi. 209 (1890); *Psilotrichum rubellum* Baker (Welw. 6509) = *Centema biflora* Schinz in Engl. Bot. Jahrb. xxi. 183 (1895); the name *Sericoma Welwitschii* applied by Mr. Baker to Welw. 6501 was employed by Sir Joseph Hooker in Gen. Plant. iii. 30 (1880), for Welw. 6508. Taken in connection with previous slips of the same kind, this seems to show that the excellent practice of writing up species as soon as they are published, which in Prof. Oliver's time used to prevail at Kew, has been abandoned. The matter becomes more serious when we remember that Kew is responsible for the Flora of Tropical Africa, which should presuppose an intimate acquaintance with the literature of the subject. It is, indeed, almost impossible to understand how such recent and easily accessible papers as those we have cited can have been overlooked, for it can hardly be attributed to any undue haste in the preparation of the *Flora of Tropical Africa;* and it suggests grave possibilities of similar carelessness with regard to other species, the records of which cannot be so easily checked.*

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* See Journ. Bot. 1894, 85; 1895, 77, 225.

It would seem that the invaluable aid offered by the *Index Kewensis* in matters of synonymy is insufficiently recognized at Kew, for Mr. Baker calls a new species of *Indigofera*, *I. macra*—a name which was published by E. Meyer in 1835 for a South African species. For Mr. Baker's plant, should it prove to be new, we would propose the name *I. Dyeri*, in commemoration of Dr. Dyer's twenty-five years' connection with the African flora, and of the issue this year of the first volume which has appeared since the editorship was intrusted to him. We notice that a variation in price has been added to the other eccentricities of the *Bulletin;* the number for "December, 1896," containing seventy-six pages, costs 4d.; that for "February and March," with twenty-eight pages, costs 8d.!

Open-Air Studies in Botany: Sketches of British Wild Flowers in their Homes. By R. Lloyd Praeger, B.A., &c. Illustrated by Drawings from Nature by S. Rosamond Praeger, and Photographs from Nature by R. Welch. London: C. Griffin & Co. 1897. 8vo, pp. xiii, 266; 7 plates, 70 figures in text. Price 7s. 6d.

It is not an easy task to write an original book on British wild flowers, but Mr. Lloyd Praeger has succeeded in doing so. In eleven chapters, or "scenes," he takes us through meadow and pasture, by the river and by the sea, over mountain and bog, and even on to a rubbish-heap! This division of localities, each one serving as a frame in which to place the flowers which form its characteristics, is of course familiar enough—it is the treatment that is new and unconventional. To begin with, the "scenes" are not imaginary, but actual places—most of them in Ireland—which are named, even the date of the visit being added; and the plants described are those belonging to the locality. In a perfectly simple and natural way we are introduced to problems connected with the movements and fertilization of plants, the forms and colours of their blossoms (about which it seems to us too much reliance is placed on Mr. Grant Allen's inferences); the distribution of seeds and of species; and the thousand-and-one points of interest known to the experienced field-botanist. From this it will be seen that Mr. Praeger's book is not of the style so painfully familiar, in which quotations at third or fourth hand from "dear old Gerarde" jostle hackneyed scraps of verse, and what is intended to be fine writing is put forward to cover want of knowledge—works which might be (and probably often are) written at as great a distance from their subjects as the "foreign correspondence" of newspapers is sometimes said to be.

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* Another instance may be noted in the publication of *Crassula aloides* N. E. Brown (*Kew Bull.* 1896, 161), based on Rehmann, no. 6375. Not only is there a much earlier *C. alooides* (in *Ait. Hort. Kew.* i. 394), which is duly included in the *Index Kewensis*, but Prof. Schinz published the same Rehmann number as new in *Bull. Herb. Boiss.* ii. 204 (1894), under the name *C. acinaciformis.*

In matters of detail the book is singularly good. It shows wide reading and an intelligent power of selection, and is written in excellent English; the references in footnotes are sufficiently numerous to be useful, without being obtrusive; and there is an excellent index. As to the nomenclature employed, there will be a difference of opinion; those who share our friend Mr. W. A. Clarke's affection for the old names will gasp when they find *Boretta cantabrica* substituted for *Dabœcia polifolia* and *Mariana* in place of *Silybum*; while others, who have reconciled themselves to these changes as necessary, will be glad that some one has had the courage to bring them forward in a popular book. There is a glossary, as well as instructions for drying plants, and suggestions of suitable books—in a word, *Open-Air Studies* is the very thing to put into the hands of those who want in small compass an intelligible and accurate introduction to field botany.

A word must be said in praise of the illustrations, which are as fresh and excellent as the rest of the book. It is a new idea in works of this kind to reproduce from photographs groups of plants *in situ*; and in so doing Mr. Praeger has set an example which we trust will be widely followed. The "flowery meadow" is as charming as the music in *Parsifal* which bears the same name; and the two photographs from Howth of *Crithmum* and *Inula crithmoides* on their native rocks, as well as the study from the Murrough of Wicklow, showing *Eryngium*, *Convolvulus*—we beg pardon, *Volvulus*—*Soldanella*, and *Glaucium flavum*, are equally successful.

We congratulate Mr. Praeger on the excellence of his book, for which we anticipate a wide circulation. It is very well printed, but we would suggest to the publishers that they should not disfigure "review" copies by putting a red ink stamp on the title-page.

Viola-Studier: Morfologisk-biologiska och systematiska studier öfver Viola tricolor (L.) och hennes närmare anförvandter. Med 14 delvis färglagda taflor samt 17 textbilder. Veit Brecher Wittrock. Acta Horti Bergiani, band II., pp. 3–142, 1897.

The forms and varieties of *Viola tricolor* L. have hardly received adequate attention at the hands of British botanists. If we consult the last edition of the *London Catalogue*, we shall find that *V. tricolor* and *V. arvensis* are retained as separate species, but to neither plant are any forms or varieties assigned. This is rather to be deplored, as from time to time certain plants coming under this head have been identified and recorded for these islands, and it seems a pity they should be lost sight of. Moreover, surely in the *London Catalogue* more consistency of treatment ought to be adopted, and we ought not to run through, or nearly run through, the letters of the alphabet with the forms and varieties of certain plants and entirely ignore those of almost equally variable species such as the plants in question.

Here are two or three instances of what is meant. An interesting little plant was recorded by Dr. Trimen (*Journ. Bot.* 1871, 199) from St. Aubyn's Bay, Jersey. He states it agrees well with the description of *V. nemausensis* Jord. in Boreau's *Fl. du Centre*, 83, and with Billot's specimens so named, and it is certainly the var. θ. *nana* of Lloyd's *Fl. de l'Ouest*, 70. "The petals are pale bluish white, a little shorter than the sepals, and the spur blue." One of the first papers in this Journal was by Mr. J. G. Baker, "On some of the British Pansies, agrestal and montane" (*Journ. Bot.* 1863, 11–16), where several British plants are more or less doubtfully identified with Jordanian species. Then there is the *Viola Rothomagensis* of T. F. Forster non Desf. in *Flora Tonbridgensis*, a plant which must not be confused with the true Rouen plant; specimens of both can be seen in the National Herbarium. In Pryor's *Flora of Hertfordshire* we have the following forms of *V. arvensis* distinguished by the author:—*V. segetalis* Jord., *V. Deseglisei* Jord., *V. Paillouxii* Jord., and doubtfully *V. nemausensis* Jord. and *V. ruralis* Jord.

Anyone taking up this subject would be greatly helped by two recent publications: the one is the elaboration of the subspecies, forms, and varieties of *Viola tricolor* for Rouy & Foucaud's *Flore de France*, and the other the subject of the present notice, a careful and well-illustrated paper by Dr. Wittrock. In the former we have keys to the subspecies, and then again keys to the forms, the authors naming very few novelties; whereas Dr. Wittrock, in nearly every case with the subspecies, varieties, and forms, adopts names of his own.

Dr. Wittrock's paper is divided into four portions, the first two treating of the morphology and biology, the third is a systematic treatment of eleven species of the *Melanium* section, and the fourth is on certain hybrids of the same section.

Four subspecies of *V. tricolor* L. are described—*genuina*, *ammotropha*, *coniophila*, and *stenochila*—and under each, forms and subforms are given; five subspecies of *V. arvensis* Murr.—*communis*, *sublilacina*, *patens*, *curtisepala*, and *striolata*—and three subspecies of *V. alpestris* DC.—*zermattensis*, *vallombrosana*, and *subarvensis*. The other plants treated of are *V. lutea* Huds. var. *grandiflora* (L. Vill.), *V. hispida* Lam., *V. declinata* Waldst. & Kit., *V. latisepala* Wettst., *V. Munbyana* Boiss. & Reut., *V. calcarata* L., *V. cornuta* L., and *V. altaica* Ker.

The descriptions are careful, and the work, as has been said, is most admirably illustrated with fourteen coloured plates; and a word of praise is certainly here well merited, as the coloured figures contribute considerably to the utility of the paper; but a doubt may be expressed whether the author has sufficiently well compared the plants he has in hand with those already bearing names, specially with species of M. Jordan's creation. This distinguished botanist, as is well known, has described a number of plants allied to *V. tricolor* and *V. arvensis*.* The most important feature is possibly the size and colouring of the petals, but the other organs all yield characters more or less valuable for systematic purposes. Next in importance to the petals are the stipules, the middle lobe of which especially undergoes a considerable amount of variation.

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* Confer Jordan, *Pugillus Plantæ Novæ—Observationes Pl. Criticæ;* and in Boreau's *Fl. du Centre*, ed. 3.

Dr. Wittrock separates *V. tricolor* from *V. arvensis* by the following characters:—

V. tricolor L. ex parte.	*V. arvensis* Murr.
V. annua biennis vel perennis; floribus submagnis varie coloratis raro (adultis) albidis; sepalis brevioribus quam petalis; horreolo pollinis clauso; granulis pollinis plerisque tetragonis, paucioribus trigonis nonnullis interdum etiam pentagonis; labello stigmatis magno; orificio stigmatis prorsum deorsum vergente.	V. annua raro biennis; floribus parvis, plerumque albidis; sepalis longioribus quam petalis vel iis fere æquilongis; horreolo pollinis aperto; granulis pollinis plerisque pentagonis, ceteris tetragonis (nullis trigonis); labello stigmatis parvo; orificio stigmatis deorsum-subretrorsum vergente.

The characters, in some cases abridged, given for the subspecies of *V. tricolor* are as follows:—

genuina Wittr., nov. subspec. V. annua vel rarius biennis; caule suberecto vel adscendente, non subterraneo; calcare appendicibus sepalorum æquilongo-dimidio longiore; horreolo pollinis semper clauso.

ammotropha Wittr., nov. subspec. V. perennans; caulibus suberectis vel adscendentibus, subtiliter hirtis; foliis ovatis (infimis)-lanceolatis (supremis); lacinia terminali stipulorum ovato-lanceolata crenis paucissimis—lanceolata integra; sepalis dimidio fere brevioribus quam petalis; petalis supremis (adultis) roseis vel roseolis, paullum divergentibus; pet. infimo roseolo vel albido; calcare appendicibus sepalorum duplo fere longiore; granulis pollinis plurimis tetragonis, ceteris pentagonis; collo pistilli macula obscura prædito.

coniophila Wittr., nov. subspec. V. perennans; caulibus adscendentibus, subtilissime hirtis vel subglabris; foliis ovatis (infimis)-lanceolatis (summis); lacinia terminali stipulorum lineari-lanceolata integra; petalis supremis plerumque purpureo-violaceis, divergentibus; petalo infimo (adulto) dilutius purpureo violaceo; granulis pollinis plurimis tetragonis, paucis trigonis, paucissimis pentagonis; collo pistilli macula obscura destituto.

stenochila Wittr., nov. subspec. V. perennans; caulibus adscendentibus subtiliter hirtis; foliis ovatis (infimis)-lanceolatis (summis); lacinia terminali stipularum lineari-lanceolata; petalis supremis (adultis) plerumque atro-violaceis paullum divergentibus; petalo infimo dilutius violaceo angusto; granulis pollinis plurimis tetragonis, paucis trigonis, paucissimis pentagonis; collo pistilli macula obscura destituto.

Viola tricolor L. *genuina* Wittr., forma typica, must be closely related to *V. Lloydii* Jordan (a description of which will be found in Lloyd's *Fl. de l'Ouest*, ed. 4, 1886, 48); this plant, or a very close ally, appears to grow in this country, M. Lloyd having kindly furnished specimens, when applied to a few years ago, to enable a comparison to be made. We should think the forma *lutescens* will be found to be synonymous with one or other of the large yellow-flowered species which M. Jordan has described, but we have not seen a named plant at all approaching f. *roseola* Wittr. or subforma *erubescens* Wittr.

The characters, also somewhat abridged, for the subspecies of *V. arvensis* are as follows:—

communis Wittr., nov. subspec. V. annua vel rarius biennis; caulibus suberectis parcius ramosis; lacinia terminali stipularum lanceolato-ovata—lanceolata, parce crenata vel integra; pedunculis (adultis) longioribus quam foliis, suberectis; flore mediocri; sepalis plerumque paullo brevioribus quam petalis; petalis supremis albidis (raro in apice violaceo-maculatis) suberectis; petalis mediis albidis, striis nectareis sæpe destitutis; calcare appendicibus sepalorum paullo longiore.

sublilacina Wittr., nov. subspec. V. annua (vel biennis?); caulibus suberectis; lacinia terminali stipularum lanceolata, integra vel parcissime crenata; flore mediocri; sepalis eadem longitudine ac petalis vel his paullo longioribus; petalis supremis lilacinis vel violaceo-lilacinis, suberectis, obovatis; striis nectariis valde distinctis; collo pistilli subnutante, macula obscura ornato.

patens Wittr., nov. subspec. V. annua vel rarius biennis; ramis inferioribus non paucis, patentibus, subprocumbentibus; lacinia terminali stipularum lanceolato-ovata—lanceolata; pedunculis eadem fere longitudine ac foliis, patentibus; flore mediocri vel majore; sepalis magnis, longioribus quam petalis; petalis omnibus prorsus vergentibus, albidis; striis nectareis ut in subspec. *communi* Wittr.; calcare appendicibus sepalorum paullo breviore.

curtisepala Wittr., nov. subspec. V. annua vel biennis; caulibus subprocumbentibus; lacinia terminali stipularum foliorum infimorum foliacea, ovata, crenata, superiorum ovato-lanceolata vel lanceolata; flore majore; sepalis tertia fere parte brevioribus quam petalis; petalis supremis suberectis, latis, lamina obovata, totis stramineis vel rarius ex parte superiore purpureo-violaceis; petalo infimo ochroleuco, striis nectariis 5–7, distinctis; capite pistilli magno.

striolata Wittr., nov. subspec. V. annua; caulibus suberectis; lacinia terminali stipularum magna, foliacea, crenata, foliorum infimorum ovata, superiorum lanceolata; flore minimo; sepalis quarta fere parte longioribus quam petalis; petalis omnibus prorsus vergentibus—corolla itaque semper fere semiclausa—adultis lilacinis longitudinaliter striolatis, quattuor superioribus striolis ternis, inferiore striolis quinque; calcare appendicibus sepalorum paullulo longiore; capite pistilli a latere viso angusto; orificio stigmatis magno.

The subspecies *communis* Wittr. bears considerable resemblance to *V. segetalis* Jordan; the latter has, however, the two upper petals marked with violet blotches towards the summit, which is said to be rarely the case in subspecies *communis*, and there may be other minor differences.

It may be noted by British botanists that the variety *atropurpurascens* of subsp. *sublilacina* was received from the Cambridge Botanic Garden. Subsp. *patens* Wittr. has much the same habit as *V. agrestis* Jordan; the peduncles, however, are generally longer than the leaves. Subsp. *curtisepala* Wittr. connects *V. tricolor* and *V. arvensis:* it is related in certainly some of its characters to *V. gracilescens* Jord.; and the last subspecies, *striolata* Wittr., has a flower of about the same size as *V. pallescens* Jord., but the petals are longitudinally striated.

Viola alpestris (DC.) Wittr. occupies an intermediate position between *V. tricolor* and *V. arvensis.* It is generally perennial, and the flowers yellow or sulphur-coloured. It inhabits alpine or subalpine situations; and here are probably to be referred several of the species described by M. Jordan from the Pyrenean region. Subspecies *subarvensis* of this species was grown from seed received from the Botanic Garden at Cambridge.

Supplementary descriptious of the other species of the *Melanium* section, previously mentioned, are also given, and there are many other points of interest which cannot be dealt with in a brief notice. No student of these plants can afford to ignore Dr. Wittrock's paper.

E. G. B.

Grundriss der Entwickelungsmechanik. By Wilhelm Haacke. 8vo, pp. xii, 398, with 143 figures in the text. Leipzig: Georgi. 1897. Price 12s.

This book, "the first work of its kind," is, the author explains, a "Lehrbuch" in the original sense of the word, and does not aspire to the rank of a "Handbuch." It is written with the object of arousing to an interest in the science of "Entwickelungsmechanik" all students of the physical and natural sciences and of their applications, and to acquaint them with its present position. Also the full-fledged "Entwickelungsmechaniker" will find something new, or at least suggestive, for the book partakes of the nature of an investigation.

He who has time and opportunity for reading the six chapters into which the subject-matter is divided will find much that is suggestive from the points of view of general biology and of botany in particular, and will, if possible, be more fully convinced than before that of making of books there is no end. In the first chapter, "Vom Gebiete der Entwickelungsmechanik," the author discusses the possibility and defines the object of his science. Its task is to investigate the part played by mechanical principles in the origin and change of organisms. Assuming its existence, the writer deals successively with its relation to Teleology, Vitalism, and Biology. Early in the second chapter, "Vom Organismensystem," under the heading Rationelle Systematik we encounter the equation $ax^2+bxy+cy^2+dx+ey+f=0$. We do not wish to dispute the accuracy of this statement, but, as it seems to have little or no bearing on botany, we will pass on. Leaving behind pictures of crystals, a diagrammatic transverse section of a fish, and the like, we come to a number of floral diagrams which illustrate "Grundformenverhaltnisse." In the primrose with its regular pentamerous whorls we have for a grundform a regular five-sided pyramid. In *Parnassia* the regularity is spoiled by the introduction of a four-sided pistil, while in *Campanula* a regular three-sided pyramid (represented by the pistil) is combined with a regular five-sided one in the outer whorls. In the disc-florets of the *Compositæ* a regular five-sided pyramid is combined with a subregular one whose base is a rhombus. And so on. The next chapter, "Vom Mechanismus der Keimesgeschichte," deals with the structure and properties of protoplasm, nuclei, and other cell-contents. Movements, spontaneous and induced, are treated in Chapter IV. (Vom Formbildungsgrund). Chapter V., is on "Form changes," and Chapter VI. and last on the Mechanism of Phylogeny. The book concludes with a copious bibliography, arranged in chronological order, followed by an index.

A. B. R.

Glimpses into Plant Life: an Easy Guide to the Study of Botany. By Mrs. Brightwen. With illustrations by the Author and Theo Carreras. 8vo, pp. 351. London: Fisher Unwin. Price 3s. 6d.

This is an excellent specimen of the best kind of "popular" book, and contrasts very favourably with many which are issued—*e.g.* with Mr. E. A. Martin's *Nature Chat*, which we noticed on p. 365. It is unpretentious and simply written, and is free from the speculations dear to the Grant Allen school of scientists; and the youthful reader, for whom it is primarily intended, will at any rate have nothing to unlearn, which is more than could be said for many more pretentious volumes. Like Mrs. Brightwen's other books, it shows much quiet observation and considerable acquaintance with the literature of the subject; the illustrations are new and are, with hardly an exception, good. The book is in fact what it claims to be, "an easy guide to the study of botany," and it may be safely recommended to those who have the charge of young folk.

*ARTICLES IN JOURNALS.**

Bot. Centralblatt (Nos. 39–41). — B. Schubert, 'Ueber die Parenchymscheiden in den Blattern der Dicotylen.' — (No. 40). T. Künkele, 'Ueber Strangbildungen im Marke von *Alnus glutinosa*.' —M. Dalmer, 'Zur Morphologie und Biologie von *Ilex Aquifolium* und *Cakile maritima* auf der Insel Rügen.'— (Nos. 41, 42). Z. Kamerling, 'Zur Biologie und Physiologie der Zellmembran.'— (Nos. 41–43). A. Kattein, 'Der morphologische Werth des Centralcylinders der Wurzel.' — (No. 42). P. Knuth, 'Blutenbiologische Beiträge.'

Bot. Gazette (26 Sept.). — C. E. Bessey, 'Phylogeny and Taxonomy of the Angiosperms.' — J. E. Tilden, 'Algal Stalactites of Yellowstone Park' (1 pl.).—A. F. Woods, 'Bacteriosis of Carnations.'—Id., 'Preserving green colour of plants for exhibition purposes.' — B. L. Robinson, 'Ecblastesis and Axial Prolification in *Lepidium apetalum.*'

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Bot. Notiser (häft 4). — A. Torssander, 'Anmärkningsvärdare Fanerogamer och Kärlkryptogame i Wärdinge socken.'—J. Hagen, '*Webera lutescens* i Sverige?'

Bot. Zeitung (16 Oct.). — Graf zu Solms-Laubach, 'Ueber *Medullosa Leuckarti*' (2 tab.).

Bull. Soc. Bot. France (xliv, 6: Sept.). — A. Franchet, 'Les *Parnassia* de l'Asie Orientale.' — L. Lutz, 'L'acide cyanhydrique dans les graines de l'*Eriobotrya.*'—E. A. Finet, '*Bolbophyllum pectinatum*, *Cirropetalum emarginatum*,' spp. nn. (tt. 2).

Bull. Torrey Bot. Club (30 Sept.). — G. N. Best, 'Vision [Revision] of the Claopodiums.' — M. E. Gloss, 'Mesophyl of Ferns.' — K. M. Wiegand, *Bidens comosa*, sp. n. — J. K. Small, 'Shrubs and Trees of Southern States.' — H. E. Hasse, 'New Lichens from S. California.'

Erythea (19 Sept.). — F. S. Collins, 'Perforating and other Algæ on freshwater Shells' (t. 1).

Gardeners' Chronicle (25 Sept.). — G. S. Jenman, *Selaginella humile*, *S. mazaruniense*, spp. nn. — (16 Oct.). *Primula Traill*i (fig. 80). —F. Kränzlin, *Eulophia Wendlandiana*, sp. n. — (25 Oct.). G. S. Jenman, *Aspidium Purdiæi*, sp. n.

Journal de Botanique (1 Sept.).—C. Sauvageau, 'Algues marines du Golfe de Gascogne.' — J. Nadlaud, 'Le genre *Hernandia* aux îles de la Société.'

Nuovo Giornale Bot. Ital. (Oct.). — M. Mazzari, 'Contribuzione alla Briologia pugliese e sadha' (1 pl.).—A. Baldacci, 'Rivista della collezione botanica fatta nel 1895 in Albania.' — L. Pampaloni, 'Fenomeni di geocarpismo nella *Morisia hypogæa.*' — E. Baroni, *Giraldia*, gen. nov. (*Compositæ Mutisiaceæ:* 1 pl.).

Oesterr. Bot. Zeitschrift (Oct.). — J. Hoffmann, 'Zur Kenntniss der Gattung *Odontites.*' — R. v. Wettstein, *Alectrolophus Sterneckii*, sp. n.—R. Heller, 'Beitrag zur Kenntniss der Wirkung elektrischer Ströme auf Mikroorganismen' (cont.).

BOOK-NOTES, NEWS, &c.

Mr. Druce has published through the Clarendon Press *An Account of the Herbarium of the University of Oxford* (6d.), which contains much interesting information about the older collections therein contained. We may return to this later. Mr. Druce's *Flora of Berkshire*, which will form a volume of 800 pages, may be expected during this month.

Mr. John Wishart sends some *Schedules for Plant Description.* There are thirty bound together in exercise-book form, and sold by Messrs. Livingstone, of Edinburgh, for 6d. (net.). Teachers of botany, who know the difficulty of getting students to write a decently systematic account of the external features of a flowering plant, would find a use for the schedule, which, except for the introduction of "root-stock" under root, is well arranged. Mr. Wishart seems, however, to have forgotten that writing occupies more room than printing, and we fear that a student will find it impossible to describe his plant in the space at his disposal anything like so fully as in the example (the wallflowers) given at the beginning of the book.

"Some New Orchids from Sikkim" is the title of two reprints from the *Journal of the Asiatic Society of Bengal*, in which Dr. King, Mr. R. Pantling, and Dr. Prain have added more than sixty species and two new genera to the Indian flora. Many of these were collected by Mr. Pantling at elevations ranging between 7000 and 10,000 feet. Among these alpine forms are three new species of *Listera*, a genus of which only four species were previously known from British India; one, *L. alternifolia*, is of special interest in having the leaves usually alternate. A new species of *Corysanthes* extends the genus considerably northwards. The genus is mainly Australian, but runs up into Malaya, the most northern point from which it has hitherto been known being the mountains of Perak. The Indian species finds its nearest ally on the high mountains of Java. *Didiciea* is a new genus of *Epidendreæ*. The name is manufactured by distributing vowels among the initials of Dr. D. D. Cunningham, who was the first to find it. It grows at an elevation probably of about 12,000 feet. Mr. Pantling's work on the Sikkim orchid-flora is commemorated by Dr. Prain in the new genus *Pantlingia*, of the tribe *Neottieæ*, and near *Limodorum*.

A List of Ferns and Fern Allies cultivated in the University Botanic Gardens, Cambridge, has been issued by the Cambridge University Press. It consists of eight pages, and costs fourpence, which seems dear.

Sir C. Purcell Taylor writes to the *Richmond and Twickenham Times* of Sept. 25th, in which he combats the conclusions published by Dr. Dyer in *Nature* for March 5th, 1896, concerning the "Sacred Tree of Kum-Bum." It is hardly fair to make Dr. Dyer responsible for the statements in the article, which consists entirely of extracts from various works, with a letter from Mr. W. W. Rockhill, the Doctor's share in it being confined to an expression of his concurrence in the opinion of M. Edouard Blanc, which he cites, and in a qualified approval of Mr. Hemsley's determination of the tree as correct. Sir C. Purcell Taylor's contradiction, apparently based on personal knowledge, was so emphatic, that, in the interests of science, we wrote to him for further information, having previously ascertained his address, which is absent from the works devoted to such matters, from the editor of the Richmond paper. In reply, Sir Charles, who appends to his name the distinctions "Bart." and "D.Sc.," writes, on a postcard: "If you like to send me £1, I will write you an account of the tree of Koom Boom; but, as I said in my letter to the paper, I don't know anything about botany." This being the case, it seemed hardly worth while to invest the sum mentioned; and the rehabilitation of the Sacred Tree has yet to be established.

The Plant World, "a monthly Journal of popular Botany," has just made its appearance at Binghamton, N.Y., under the editorship of Dr. F. H. Knowlton, of the National Museum, Washington. *The Fern Bulletin*, "an illustrated 16-page quarterly," "the only Journal in the world devoted entirely to Ferns," edited by Mr. Willard N. Clute, is issued from the same place; this is in its fifth year.

The fungus causing the sooty mould of orange and other trees in America has been determined by Mr. H. J. Webber, in a paper issued by the U. S. Department of Agriculture, June 17th, 1897, to be a species of *Meliola*. Mr. D. McAlpine (*Proc. Linn. Soc. N. S. Wales*, 1896, part 4) traces the Australian pest to a hitherto undescribed species, *Capnodium citricolum*. The two genera are closely allied in habit; they differ somewhat in the form of the fruit and spores. The leaves of the plant affected are covered by a thick layer of felted mycelium, which effectively excludes the sunlight from the chlorophyll cells, and checks the development of the plant, and the formation of flower and fruit. The fungus does not penetrate the tissue; it lives saprophytically on the honey-dew extruded by scale insects, and it has been found that it always follows a visitation of these creatures. Mr. McAlpine calls attention to the undue destruction of "sugar-loving, brush-tongued parakeets and other birds which formerly abounded so greatly," and which held the insects in check. Similar methods of spraying and fumigating the plants in order to kill insects and mould are recommended by both gentlemen, and have proved more or less efficacious; but on the old principle of "like cures like," a fungus, *Aschersonia*, which preys on the larvæ of scale insects, has been utilized in America, and bids fair to reduce their number and the subsequent growth of the mould. Mr. Webber describes some interesting and successful experiments with the scale-fungus, and an allied form is recorded by Mr. McAlpine as having attacked some species of scale insects in Australia.—A. L. S.

We have received the following from Dr. Wilms, which (we hope) explains itself:—

"Frederic Wilms, phil. Dr. and Botanist after taking his residence in South-Africa for about 14 years has returned to his home-country with a rich profit of natural-historic Collections. Especially he took care to the floristical exploration of the Transvaal-Republic, and has just given over his first number of collection of the well prepared and richely spend Transvaal-Plants to the Royal-Botanical Museum of Berlin. The officials of this well known Institut will kindly undertake the determination, and the description of the new specimen will be published by the above Gentlemen in the possibly shortest time in „Engler's Botanische Jahrbücher". The manuscript-names are authentic until to the publication. The Collection Wilms will be edited by the undersigned to all Museum of Botany and also to privates as far as possible. The first centuries shall be delivered to the subscribers already in January 1898. The price is fixed for the first six collections to £ 2 pro centurie, and for the following numbers to Shillings 30. The collection contains in his first number over 1500, and goes down in the last collections to 300—400 specimen."

Five years having elapsed since the publication of the *Bibliographical Index of British and Irish Botanists*, we propose to issue a supplement. This will in the first instance appear in the pages of the *Journal*, and will probably be reprinted in pamphlet form, although the considerable loss incurred upon the original work is somewhat discouraging to the compilers. The supplement will include, in addition to those who have died during the past five years, certain names which, from one cause or another, were omitted from the *Index*. The Editor of this Journal will be glad to receive a note of any such omissions, in order that the supplement may be made as complete as possible.

Mr. John Weathers has resigned the post of Assistant Secretary to the Royal Horticultural Society.

The *Standard* of October 26 waxes eloquent over "the conclusion of the *Flora Capensis*," apparently in ignorance of the fact that this "conclusion" has only just begun. "For the last twenty years," says the *Standard*, "the determination of South African plants alone has occupied almost the whole time of one member of the Kew Staff. As the number of these is said to have exceeded ten thousand, we are only surprised to find the word 'almost' inserted. The book, of course, occupied several years in preparation and publication, and so fast, indeed, has material been found, that it became necessary to issue an appendix with the last volume. Travellers and residents in South Africa have co-operated in sending materials to Kew; and although, no doubt, more appendices will have to be issued, or perhaps another edition of the work undertaken, before the next quarter of a century is ended, yet even now botanists can obtain a good and trustworthy notion of the flora of the southern part of the Dark Continent." The suggestion that a new edition may be undertaken before twenty-five years have elapsed will amuse those who know that exactly that period has been necessary to produce a single volume of the work.

The Botanical Department of the British Museum has lately acquired about seventy drawings by the late Dr. Lindley, among which are the greater number of the originals of the plates of his *Collectanea Botanica*. The drawings, which are beautifully executed, are many of them in the style and manifestly were drawn under the influence of Ferdinand Bauer, who was at that time associated with Lindley in the *Digitalium Monographia*.

The Editor of *The Naturalist* is anxious that we should point out that "there is not, and never has been, to [his] knowledge, a journal called the 'Yorkshire Naturalist,'" as might be supposed from a foot-note to p. 250 of our June number. The slip is not a very serious one, for no one could doubt what journal was intended, and it is correctly cited on p. 259; but as Mr. Roebuck seems to think the matter important, we gladly publish this correction.

The death of Dr. William Walsham How, Bishop of Wakefield, deserves a word of notice, as, without being technically a botanical worker, he had an excellent knowledge of the British flora. In 1857, being then vicar of Whittington, in Shropshire, he was one of the founders, and elected vice-president, of the Oswestry and Welshpool Naturalists' Field Club and Archæological Society, and he afterwards became its president. A paper on "The Botany of the Great Orme's Head" was one of his contributions to the *Proceedings* of the Society; it appeared in the *Report* for 1857–1864, published in 1865. He also contributed the botanical information to the *Gossiping Guide for Wales*. In 1879 Dr. How was appointed Suffragan Bishop of Bedford; in 1888 the new See of Wakefield was formed, and he became its first occupant. The presidency of the Yorkshire Naturalists' Union for 1890 was offered to and accepted by him. His death occurred somewhat unexpectedly on the 10th of August last, at Leenane, Connemara. A fuller notice by Mr. William Whitwell, with portrait, is published in the *Naturalist* for October.

Edmund John Baillie, who died at his residence at Upton Park, Chester, on October 18th, in his forty-seventh year, had been for many years a member of the horticultural firm of Dickson & Sons. Although not a critical botanist, he had considerable knowledge of British plants, and in 1878 contributed to the Proceedings of the Chester Society of Natural Science a paper on "The City Flora." Mr. Baillie will be greatly missed in Chester, where he was a prominent figure in every movement connected with social or intellectual advancement, in which his natural kindness of heart found an outlet. He took great interest in the Chester Museum, and frequently lectured on subjects connected with natural history and horticulture. He became a Fellow of the Linnean Society in 1883. Mr. Bailey was born at Hawarden, Cheshire, on May 4th, 1851.

The Rev. Charles Samuel Pollock Parish died on Oct. 18 at his residence, Roughmoor, Somerset, at the age of seventy-five. Mr. Parish took his B.A. degree at St. Edmund's Hall, Oxford, in 1841. After holding a curacy in Somersetshire for some years, he became in 1852 English chaplain at Moulmein, Birma, and at once took up the study of botany, devoting himself especially to Orchids, many of which—e.g. *Vanda Parishii*, *Dendrobium Parishii*—bear his name. *Dendrobium Parishii* was described in 1865 by Mr. James Bateman (*Bot. Mag.* 5488), who says:—"A glance at the recent volumes of the *Botanical Magazine* will show the large number of new and beautiful Orchids that have been secured to the collections of this country through the zeal and enterprise of Mr. Parish, whose eye seems to be ever ready to detect any new forms amid the striking vegetation of the rich country that is now the scene of his missionary labours." Many of his novelties were described by Reichenbach in the *Gardeners' Chronicle* and elsewhere. In 1878 Mr. Parish returned to England, and took no further permanent duty, though he continued to interest himself in botany and in the Somerset Archæological Society. He published several botanical papers in the *Journal of the Asiatic Society of Bengal* and elsewhere.

Tab. 377.

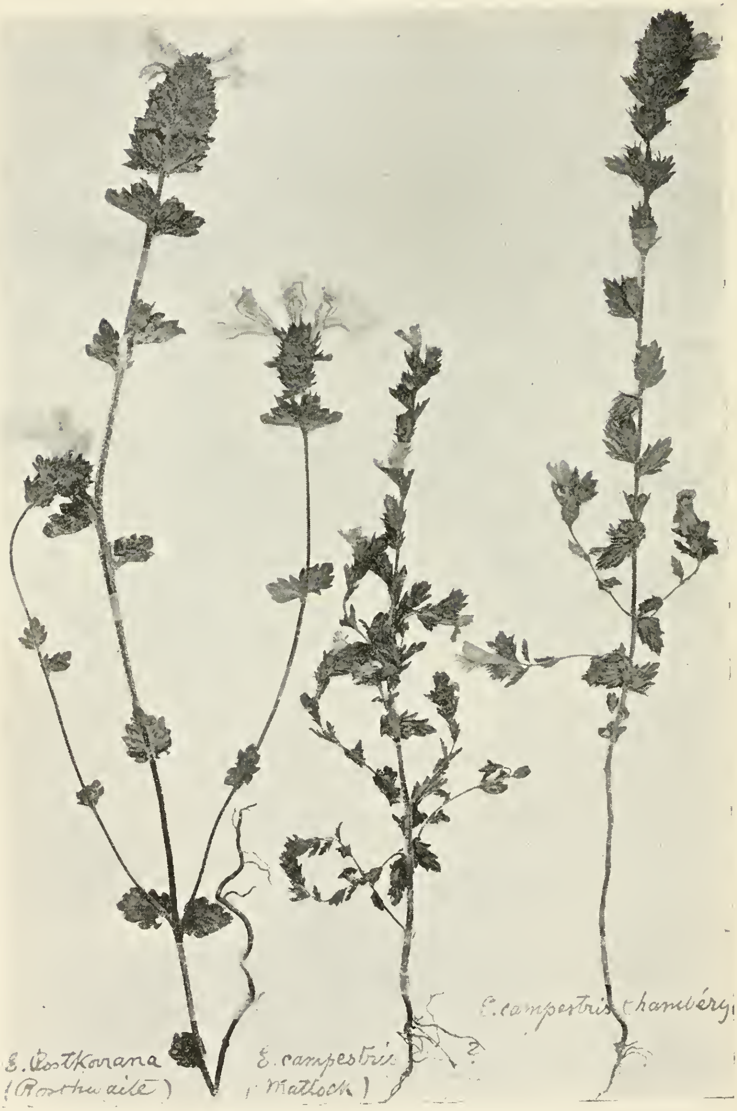
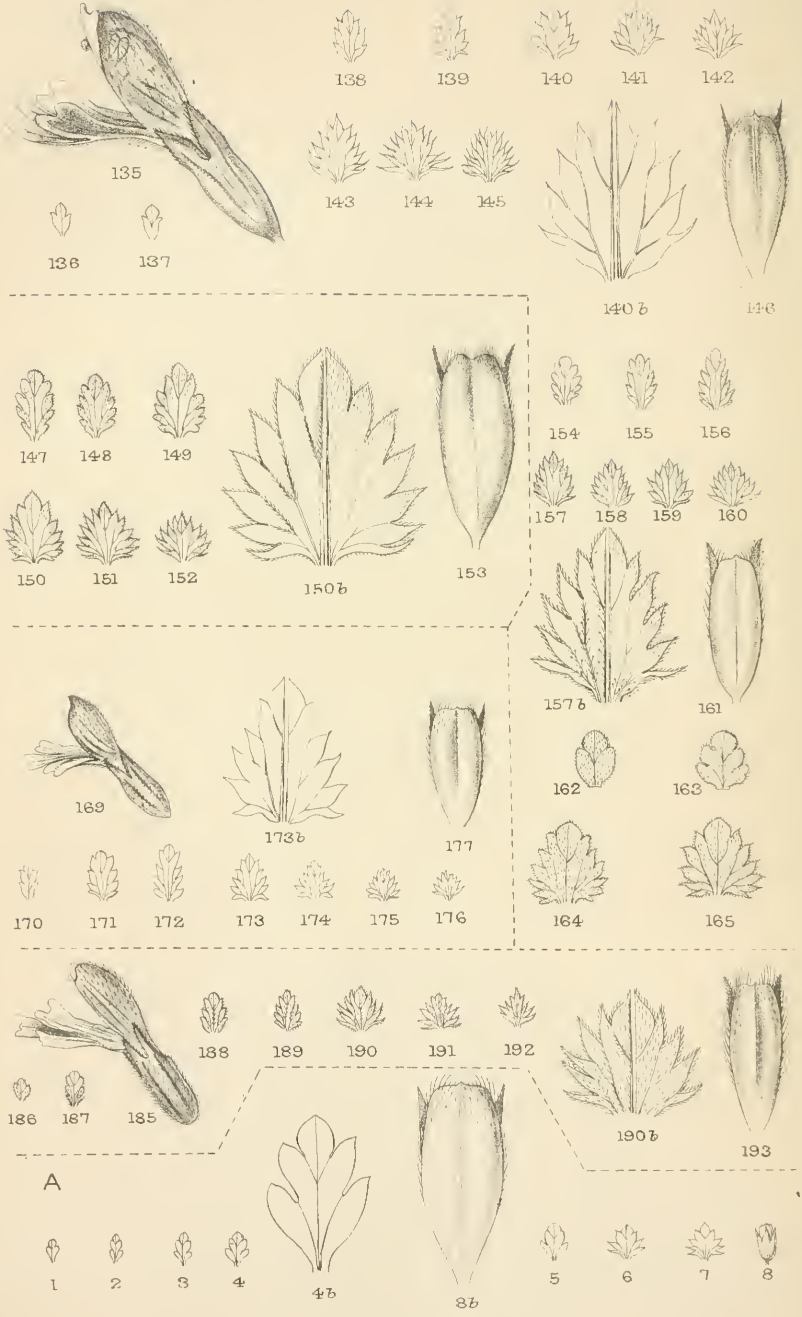

E. Rostkoviana
(Rosthwaite)
E. campestris
(Matlock)
E. campestris Chambéry

Photo. E. H. Boddington. Hibberd sc.

Monograph of Euphrasia.

Tab 378.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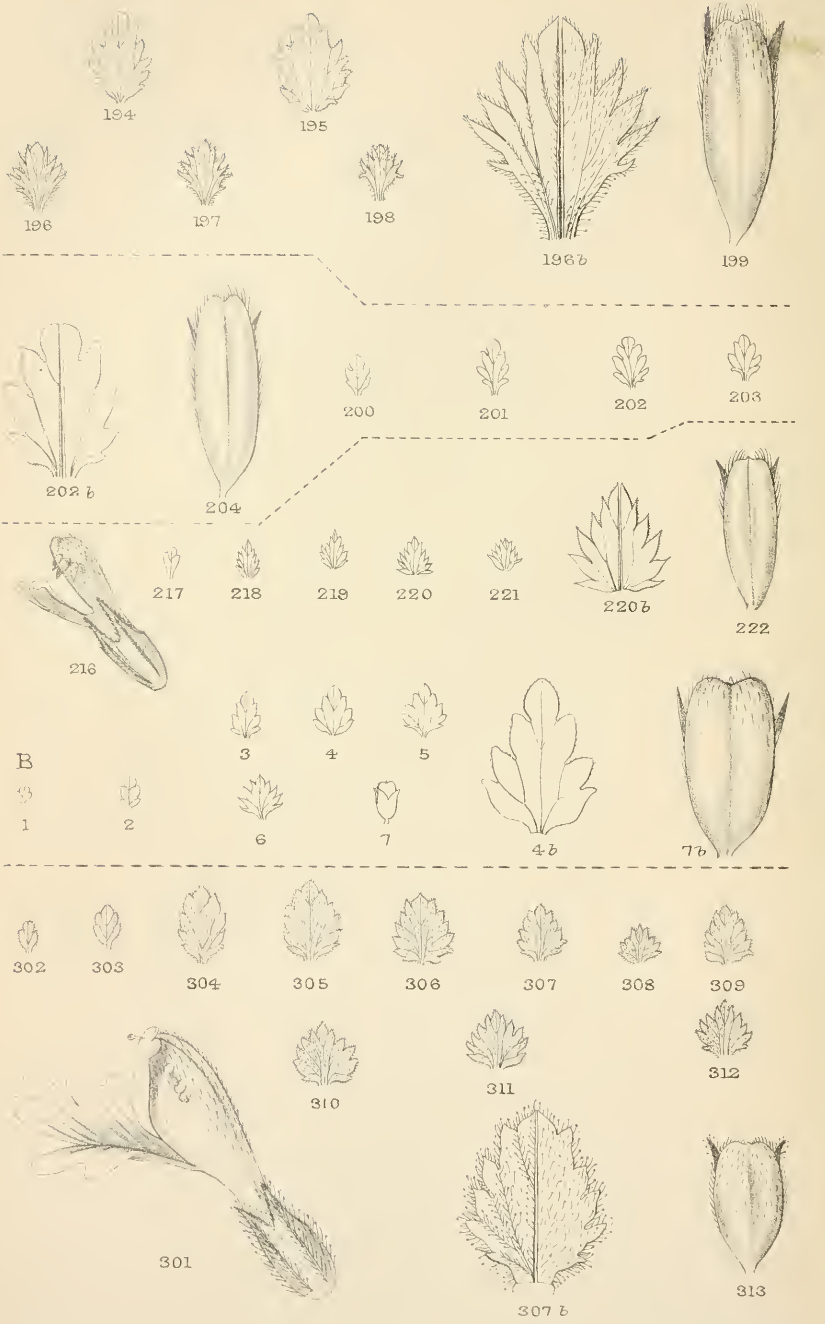
West, Newman imp

Details of Euphrasia.

Tab. 379.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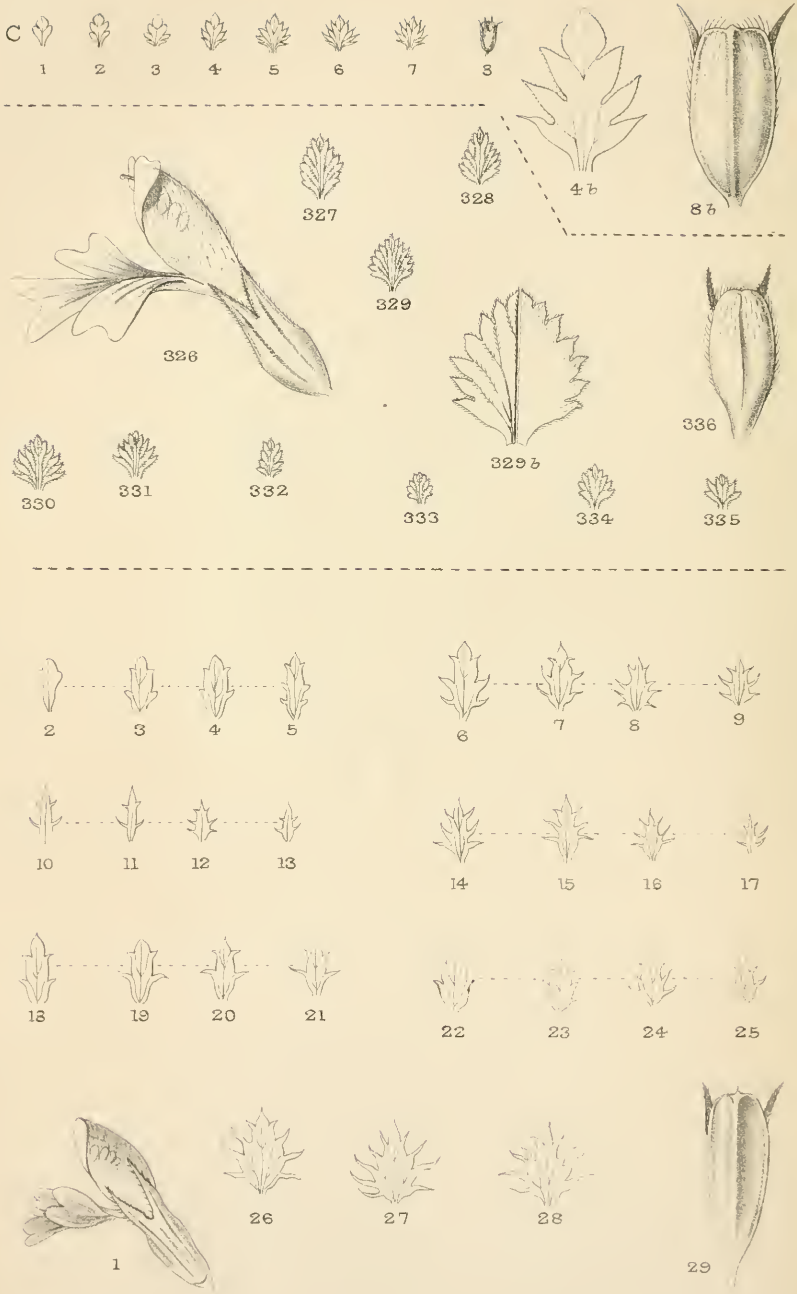
R. Morgan lith

West, Newman imp.

Details of Euphrasia.

Tab. 380.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R. Morgan lith.
West, Newman imp

Details of Euphrasia.

MONOGRAPH OF THE BRITISH SPECIES OF EUPHRASIA

PREFACED BY AN EPITOME OF PROF. WETTSTEIN'S VIEWS ON THE DEVELOPMENT AND DISTRIBUTION OF THE EUROPEAN SPECIES.

By Frederick Townsend, M.A., F.L.S.

(Plates 374–80.)

(Concluded from p. 426.)

§ 2. Grandifloræ Wettst.

Foliorum longitudo latitudinem in maximo duplo superans. Capsulæ margine semper erecto ciliatæ. Corollæ tubus fine anthesis elongatus, itaque corollæ initio anthesis breviores quam fine anthesis.

11. Euphrasia Rostkoviana

Hayne, Arzneikunde Gewächse, ix. 7 (1825). Wettst. Mon. p. 183.

Caulis erectus vel ascendens, rarissime simplex, plerumque *in parte inferiore* ramosus 40 cm. altus, viridis vel rubescens vel fuscescens pilis crispulis reversis albidis et ad nodos, hinc inde etiam in internodiis *pilis longis glanduliferis pubescens*, ramis suboppositis ascendentibus hinc inde iterum ramosis. Folia caulina infima cuneata obtusa dentibus utrinque paucis obtusis, media et superiora *ovata, breviter acuminata, dentibus utrinque 3–6 acutis sed non aristatis.* Bracteæ suboppositæ, foliis caulinis similes sed latiores et breviores sensim diminutæ et ad apicem inflorescentiæ sæpe basi cuneatæ, *dentibus acutioribus sed non aristatis.* Folia omnia viridia rarius rubescentia, in regione alpina hinc inde nigro-marginata, subtus *plicato-striata* setulis *albidis eglandulosis* et (saltem bracteæ ad basin) *pilis longis glanduliferis* plus minus dense obsita. Spica initio condensata, mox elongata. Flores subsessiles. Calyx *indumento ei foliorum conformi obtectus, semper glandulosus*, fructifer non accretus. Corolla magna, *initio* in dorso circa 9–11, fine anthesis 11–14 mm. longa, tubo fine anthesis elongato calycem conspicue superante, labio superiore bilobo, lobis emarginatis vel bilobis reflexis, labio inferiore trilobo lobis profunde emarginatis. Corolla plerumque alba labio superiore violaceo, labio inferiore macula lutea et striis violaceis picto, fauce luteo; hinc inde tota plus minus violascens; rarius etiam superiore albo. Capsula elliptica emarginata, calycis dentes non vel parum superans, margine longe erecto-ciliata, cæterum breviter pilosa.

*Syn. *E. officinalis* Gremli, Excurs. Fl. d. Schw. 5, Aufl. S. 329 (1885), 7 Aufl. S. 318 (1893).—Boreau, Fl. d. centr. d. l. Fr. ed. 3, p. 492 (1857).—Grenier, Flor. Jurass. p. 563 (1865).—*E. officinalis* α. resp. a. *pratensis* Koch, Synop. Fl. Germ. ed. 2, p. 628 (1844).—*E. officinalis* A. *Platyphyllæ* a. *pratensis* Reich. Ic. Germ. et Helv. p. 58 (1862). — *E. officinalis* A. *grandiflora* Soyer-Willemet, L'*En-*

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* For fuller synonymy see Wettst. Mon. pp. 183–184.

phrasia officinalis et les espèces voisines, p. 25.—*E. officinalis* A. *pratensis* Fries, Novit. Fl. Suec. p. 198 (1828).—*E. officinalis* γ. *vulgaris* Benth. in DC. Prod. x. p. 552 (1846).

Exsicc. There are three specimens named *Euphrasia officinalis* on one sheet in the Herb. Linn. (Linn. Soc.). The two outer specimens are *E. Rostkoviana* Hayne. The central sp. is *E. nemorosa* H. Mart. The name *officinalis* is written under the specimens in Linnæus's own handwriting. Schultz, Herb. norm. nov. Ser. Cent. 9, No. 1839.

Fig. Tab. 377. Tab. 379, fig. 301–313. Hayne, Arzneigew. ix. t. 7 (1823).—Sturm, Deutschl. Fl. 14, Kl. 2, Ord.—Sowerby, Eng. Bot. ed. 3, tab. dccccxci.—Wettst. Mon. taf. v. fig. 301–313, taf. ix. fig. 1.

Fl. July–Sept.

Distrib. Throughout Mid Europe; it is the most frequent species in the centre of an area comprising France, Belgium, Great Britain, Russia, South Sweden and Norway, Upper Italy, North Balkan Peninsula, South Germany, Austria, and Switzerland.

Distrib. in England and Wales: Cornwall, Cuna Parell (1883); *A. Ley* (J. Britten comm.). Lizard (1852); *J. Woods Herb.* Cumberland, "Rosthwaite" [1884] (Townsend; H. Fr.); *Wettst. Mon.* "Cumberland" (Woods Herb.); "*Borrer.*" Derby, "Buxton (Townsend; H. Fr.)" 1884; *Wettst. Mon.* Devon, Marsh Mills (1879); *R. I. Lynch.* Hants, Kingsclere (1853); *W. Matthews.* Hereford, Ewias Harold Common (1854); Croft (1852); *W. H. Purchas.* Kent, Cobham (1879); *R. A. Rolfe.* Leicester, Twycross (1843). Surrey, Milford (1896); *E. S. Marshall.* Mill-pond, Hedge Court (1883); *W. H. Beeby.* Earlswood Common (1880); *G. Nicholson.* Warlingham (1880); *J. Groves.* Croydon (1880); *W. F. Marshall.* Sussex, Storrington (1853); *J. Woods Herb.* Westmoreland, Rydal; *W. W. W.* (Herb. F. Townsend).

Distrib. in Scotland: Argyll, "Oban (Townsend; H. T. Z.)." 1881; *Wettst. Mon.* Caithness, "(Linton; H. Murb.; H. Richt.)"; *Wettst. Mon.* Reay; *W. F. Marshall.* ROSS, Howle Hill, Walford (1891); *A. Ley* (Herb. W. H. Purchas).

Distrib. in Ireland: Kerry, Dingle (1853); *D. Oliver.* Meath, Oldcastle (1896); *R. Lloyd Praeger.* Queen's, Emo (1890); *R. Lloyd Praeger.* Tyrone, Baron's Court (1896); *R. Lloyd Praeger.*

E. Rostkoviana occurs in the British Isles mostly at low altitudes and in dampish ground. The species was named by Hayne after Dr. Rostkovius who found it in the neighbourhood of Stettin and sent it to Dr. Hayne as a distinct species. Dr. Hayne says, in Arzneikunde, that "*Euphrasia Rostkoviana* is really very similar to *E. officinalis* (Arzn. ix. t. 8) for which reason it has hitherto been unnoticed, but it may with certainty be distinguished from it by the following characters. The leaves are serrate, furnished on both sides with soft glandular hairs, the upper ones mostly opposite, the teeth not acute or aristate, glabrous on both sides, without glands, the upper ones mostly alternate, the calyx furnished with glandular and eglandular hairs . . . the capsule rotund-linear, not obovate-linear . . . the seeds 16-ribbed, not 12-ribbed." I have specimens from "loco classico," and the typical English plant well represents these, specimens from Borrowdale especially so. The southern continental form is usually more branched and of humbler growth; the whole plant is of a lighter green colour, the teeth of the leaves and bracts are narrower, and more acute and cuspidate.

The English plant is variable, the variations being produced probably by environment. The height is variable, also the amount of branching, the length of the spike, the length of the internodes of the spike, the size of the flowers, the size of the leaves and bracts, the amount of pubescence, glandular and eglandular. I have a specimen from the south of England which measures 40 cm. A remarkable form from the sea-shore at Reay, Caithness, gathered by Rev. E. F. Marshall, is about 6 cm in height, with stout stem and branches, short dense spikes, broad leaves and bracts, and the whole plant is rendered grey in appearance from the profuseness of glandular and eglandular pubescence. Mr. Marshall says the form is very plentiful.

Several varieties have been named by continental botanists, among which Prof. Wettstein gives—var. *uliginosa* Ducomm. growing in boggy ground and attaining a height of as much as 50 cm when surrounded by tall herbage; var. *laxiuscula* Lasch., only slightly glandular; var. *minuta* Beck, a dwarf form with few leaves and fls., occurring in alpine regions; var. *pinguis* Ljungström (Herb.), leaves large and broad, sparsely hairy, flowers few, occurring in damp and shady places in rank herbage; var. *minoriflora* Borbás (Geogr. atque enum. pl. com. Castriff. 1887–8), corolla relatively small; f. *rubra* Baum. (pro spec.), corolla reddish violet; var. *affinis* Freyn, very hairy, capsule somewhat prolonged. Prof. Wettstein has experimented upon vars. *uliginosa*, *minuta* and *minoriflora* and finds that they are induced by environment. The var. *affinis* may be a hybrid with *E. hirtella*. On the borders of the area occupied by *E. Rostkoviana* forms occur which are less hirsute and with shorter glandular hairs, instances occur in the Balkan Peninsula, in Poland, and on the S.W. border; the form occurring in the latter or S.W. border is constant, and is the *E. campestris* of Jordan, which may also be a native of England (see species No. 12). *E. Rostkoviana* is easily distinguished from all other British species, with the exception of three which I am about to name, by the presence of glandular hairs; from *E. campestris* by the presence of much longer jointed glandular hairs and by its larger leaves and bracts; from *E. brevipila* by its larger flowers with exserted corolla-tube, and by the long jointed glandular hairs on stem, leaves, bracts and calyx; from *E. occidentalis* by its larger flowers and exserted corolla-tube, usually much taller growth, and also by its long and jointed glandular hairs, the glandular hairs of *E. occidentalis* being much fewer and very shortly stalked.

In this species, just before the expansion of the flower the style is curved over the anthers, but as the flower opens the upper portion of the style straightens and becomes porrect, projecting beyond the upper lip. The tube of the corolla lengthens by growth during flowering, carrying the stamens up along with it; the style, which does not lengthen, but straightens, is then drawn into the tube and disappears behind the anthers which ultimately exceed the style and stigma. The stigma is, as already stated, ripe for fecundation some time before the bursting of the anthers. In Oesterr. Bot. Zeit. June, 1882, Kerner makes some interesting and valuable remarks on this position of the stigma in this and other species of the genus.

12. EUPHRASIA CAMPESTRIS

Jordan, Pugillus plant. nov. p. 131 (1852).—Wettst. Mon. p. 193.

"E. racemis terminalibus modice elongatis foliosis, calycis pedunculati ad nervos pilis *glanduliferis* brevibus obsiti semiquadrifidi lobis lineari-lanceolatis breviter acuminatis erectis, corollæ (haud parvæ) tubo calycem *fere superante*, labio superiore lilacino fasciolis violaceis insignito extus inferne punctulis nigris notato bifido, lobis emarginatis reflexis, labio inferiore albido in medio flavo-maculato trifido, lobis porrectis profunde emarginatis, capsula calyce paulo breviore folium fulcrantum *superante* oblonga inferne leviter angustata apice *subæquali* hispida *subtruncato-emarginata* mucrone brevi *subexserto* apiculata, foliis parvis sæpe obscure virentibus patulis pube minuta *sæpe glandulifera* adspersis oblongo-ovatis basi in petiolulum angustatis profunde dentatis, dentibus utrinque sæpius 4 lanceolatis, foliorum superiorum breviter acuminatis, caule erecto flexuoso ramosissimo, ramis tenuibus *subarcuato-patulis* pube reversa *brevi* superne pilis *glanduliferis* intermixta obductis."—Jordan (*l. c.*).

SYN. *E. officinalis* f. *campestris* Grisebach et Schenk in Linnæa, xxv. p. 603 (1853).—*E. officinalis* b. *campestris* Gremli, Excurs. Flora f. d. Schw. 7th ed. p. 318 (1893).—*E. campestris* Boreau, Fl. d. cent. d. l. Fr. ed. 3, ii. p. 492 (1857). Grenier, Flor. Jurass. p. 563 (1865).

FIG. Tab. 377. Tab. 380, fig. C 1–8. Wettst. Mon. taf. xii. fig. 1.

EXSICC. Gandoger, Flor. Gall. exs. No. 404 (as *E. Tholeyriana*);—Schultz, Herb. norm. No. 930 & 930 bis.

FL. Middle Sept. to middle of Oct. (Jord.).

I have not seen fresh specimens of this plant and have therefore followed Prof. Wettstein in giving Jordan's description in Pug. where M. Jordan remarks "C'est l'espèce le plus tardive, il est en bon état du 15 Sept. au 15 Oct. dans nos environs" (*i.e.* Lyons). There are specimens of *E. uliginosa* Ducommun in Herb. Reuter, from Marais du Coin, which appear to me to be quite those of *E. campestris* Jord.; the style is nearly straight, the cor. tube fairly long though the fls. are small. On the ticket accompanying these specimens Ducommun writes "differt ab. *E. officinalis* floribus minoribus, labio superiore extus albido, pilis brevioribus, et capsula tubum calycis parum excedente." "30 Aout, –55."

DISTRIB. "South-east France and in the neighbouring part of Switzerland." ? England.

I have given the description of this species because I collected a plant on the limestone hills about three miles south of Buxton, on

July 30, 1884, which resembles it. It is the *E. officinalis*, a. *Rostkoviana*, f. *tenuis* mihi of the *London Catalogue*, ed. 9. It is 7–10 cm high. The flowers are moderately large, the calyx and bracts with very short glandular and eglandular hairs, the style as in *E. Rostkoviana*, the leaves and bracts have a cuneate base. Prof. Wettstein having only seen specimens in an early stage entered this plant in his Monograph as *E. brevipila* (p. 12, Wettst. Mon.), but having sent him more advanced specimens he now sees they cannot be referred to that species. He writes "Eine Pflanze, die mir nicht klar ist," but says that if it is within the area of *E. campestris* it would in fact be *E. campestris* Jord. A hybrid between *E. Rostkoviana* and *E. nemorosa* which I found in the same neighbourhood in company with its parents, bearing the characters of them both, is a very different plant.

E. campestris differs from *E. Rostkoviana* by its humbler growth, its branches usually springing higher on the main stem, by its narrower leaves and bracts furnished with much more shortly-stalked glands. Prof. Wettstein hesitates to give a definite opinion about it, but remarks that it comes very near *E. Rostkoviana.* Taking into consideration its wide distribution throughout a considerable portion of the Rhone watershed, the constancy of its characters, and its acceptance as distinct from *E. Rostkoviana* by those botanists who have seen the living plant (Jordan, Muret, Reuter), Prof. Wettstein also accepts the distinction, looking upon it as a species derived from *E. Rostkoviana* at a comparatively recent date, and leaving it to further observation to determine whether the separation is warrantable.

13. E. Kerneri

Wettstein in Engler and Prantl Natürl. Pflanzenfam. iv. 3 b, S. 101 (1893).—Wettst. Mon. p. 201.

Caulis erectus vel ascendens, in parte inferiore *ramosus, non raro bi vel ter ramosus*, 10–40 cm altus, rubescens vel fuscescens pilis albidis crispulis reversis etiam in nodis *eglandulosis* pubescens, ramis suboppositis erecto-patentibus. Folia caulina inferiora (florendi tempore plerumque jam emarcida) cuneato-obtusiuscula, utrinque dentibus paucis; media et superiora ovata *elliptica acuta dentibus utrinque 4–7 acutis triangularibus;* bracteæ basi *cuneatæ* utrinque dentibus 3–6 *antrorsum vergentibus longe acuminatis* et *in mucronem productis;* folia omnia eglandulosa setis minimis imprimis in margine et in nervis scabrida, siccata sæpe fuscescentia. Spica initio densa, mox valde elongata. Flores subsessiles. Calyx eglandulosus, dentibus elongato-lanceolatis acuminatis mucronatis scabris. Corolla magna initio dorso cca 10, fine anthesis 11–13 mm longa et tunc calycis dentes tubo superans, labio superiore bilobo lobis bilobis reflexis, labio inferiore trilobo lobis profunde emarginatis. Corolla plerumque albida in fauce et in basi labii inferioris macula lutea, cæterum striis violaceis picta; labium superius sæpe totum violascens. Capsula oblongo-obovata emarginata, margine erecto-ciliata, cæterum breviter pilosa, dentibus calycinis superata.

SYN. *E. speciosa* A. Kern. in Oesterr. bot. Zeitschr. xxiv. p. 115 (1874); non R. Br.—*E. arguta* A. Kern. in Schedæ ad Flor. exs. Aust.-Hung. i. p. 40, no. 146, non R. Br. —*E. Kerneri* Beck, Flora von Nied.-Oesterr. ii. S. 1060 (1893).—Wettst. in Oesterr. bot. Zeitschr. xliv. p. 379 (1894).—*E. Rostkoviana* v. *macilenta* Towns. Lond. Cat. of Brit. Plants, ed. 9.—Wettst. Mon. p. 203.

EXSICC. A. Kern. *l. c.* No. 146 (as *E. arguta*).—Schultz, Herb. norm. nov. ser. Cent. 21, No. 2053 (as *E. arguta*).

FIG. Tab. 375. Tab. 380, fig. 326–366. Wettst. Mon. taf. v. fig. 326–336, taf. ix. fig. 10.

FL. August? to Sept.

DISTRIB. Eastern Austria east of the Danube, also in two extended areas, north and south of the Alps, *viz.* from Lower Austria to the Canton of Thurgau, and from Krain to Upper Italy, also in Silesia and doubtfully in one spot in Pomerania.

DISTRIB. IN ENGLAND: DERBY, near Matlock (1881); *H. & J. Groves.* SURREY, Epsom Downs (1880); *H. & J. Groves.* Whitehill, near Caterham (1882); Moulsey Hurst (1882); *E. F. Marshall.* Chelsham, near Croydon (1880); *A. Bennett* "(Bennett; H. Towns.)" (Wettst. Mon.). Reigate Hill (Sept. 1896); Betchworth Hill (Sept. 1896); *E. S. Salmon.* KENT, Upper Halting (on chalk) (Sept. 1894); *A. H. Wolley Dod.* SOMERSET, Cheddar (Sept. 1853); *W. H. Purchas.* Lewis (1853, as *E. officinalis*); *Jos. Woods Herb.*

In England this species seems to be found only on a limestone soil. Mr. Bennett informs me it is fairly abundant in the station near Croydon. The Pomeranian and English stations are remarkably isolated and distant from the large and extended area of the plant in West Europe, but Prof. Wettstein thinks the plant may have been introduced in the Pomeranian station; there is no doubt about its being native in England.

Kerner's names "*speciosa*" and "*arguta*" were preoccupied by Robt. Brown, who gave them to two Australian species. Prof. Dr. Beck named the plant in honour of Prof. Dr. Kerner, the distinguished Austrian botanist, author of *Pflanzenleben*, of which an English translation has been published.

E. Kerneri resembles *E. Rostkoviana* in several respects, but it is entirely without glands. The flowers are similar both in size and in the length of the corolla-tube; the branching is also similar, but the leaves and bracts in the English plant are smaller and the teeth narrower and more acuminate than those of *E. Rostkoviana.* These characters of the leaves and bracts also distinguish the plant from *E. versicolor* Kern., to which *E. Kerneri* appears to be closely allied, but the former has not been found in England. The only var. of *E. Kerneri* which has been noticed is one which Prof. Wettstein has named v. *maritima* and was found on the sea-coast near Venice. It has narrower and smaller leaves, shorter than the calyx, which is fleshy, and has from 1–2 teeth on either side.

§ 3. ANGUSTIFOLIÆ.

Foliorum longitudo latitudinem 2–30-plo superans, folia itaque non ut in § 1 et 2 ovata, vel ovato-elongata sed linearia vel lanceo-

lata. Corollæ tubus in speciebus nonnullis fine anthesis non elongatus, in aliis elongatus.

14. Euphrasia Salisburgensis

H. Christ; Funck, "Nachricht von einigen seltenen gesammelten Pflanzen," in Hoppe, *Taschenbuch* (1794), pp. 184 and 190. Wettst. Mon. p. 218.

Caulis erectus, simplex vel in *parte inferiore ramosus*, 1–30 cm. altus, rubescens, pilis crispulis reversis eglandulosis pubescens, ramis erectis, inferioribus oppositis, superioribus alternantibus. Folia caulina inferiora opposita, *cuneiformia*, *obtusa* utrinque dentibus–2 obtusis; folia caulina superiora alternantia, lanceolata, in parte media latitudine maxima, *longitudine latitudinem 2-5-plo superante*, plerumque acutissima, *utrinque dentibus aristatis patentibus 2–3*. Bracteæ alternantes latitudine folia caulina superantes, sed eis similes, in triente inferiore latissimæ, utrinque *dentibus 2–5* (*plerumque 3*) *elongatis*. Folia omnia viridia vel præsertim in parte inferiore plantæ rubescentia, *glaberrima* vel in pagina inferiore glandulis sessilibus vel in margine et nervis prominentibus setulis minimis sparsis. Spica initio condensata, fructifera valde elongata. Flores subsessiles. Calyx glaber vel *setulis minutis* obsitus, fructifer modice accretus; dentes lanceolato-triangulares. *Corolla parva* fine anthesis 6–8 mm lg., labio superiore bilobo, lobis reflexis emarginatis vel denticulatis, labio inferiore 3-lobo, lobis emarginatis, subtus *solum ad basin pilosis*. Corolla plerumque albida labio superiore cæruleo, sed etiam tota cærulea, purpurea vel violacea. Capsula cuneato-elongata, truncato-emarginata, calycis dentes subæquans vel superans, *glaberrima* vel solum in parte superiore marginis pilis sparsis *brevibus* inflexis ciliata.

Syn. *E. officinalis* ε. *Salisburgensis* Benth. in DC. Prod. x. p. 553 (1846).—*E. Soyeri* Timbal-Lagr. Diag. 1856, sec. Grenier, Flor. Jurass. p. 569 (1865).—Townsend in Journ. Bot. 1884, 166; 1896, 441.—*E. Salisburgensis* Koch, Syn. Flor. Germ. et Helv. ed. 1, p. 545 (1838).—Reich. Flor. Germ. excurs. p. 359 (1830–32).

Exsicc. Schultz, Herb. Norm. No. 932.—Fries, Exs. Fasc. xiv. No. 20.—Reich. exsicc. No. 48.

Fig. Tab. 376. Tab. 380, fig. 1–29. Braune, Salzb. Flor. ii. tab. i. fig. 1 (1797).—Reich. Deuts. Fl. mdccxxxii. 3–5.—Wettst. Mon. taf. iii. fig. 1–29, taf. x. fig. 6–10. — Journ. Bot. 1896, tab. 363.

Fl. July–Aug.

Distrib. Scandinavia (Arctic Norway); Christiania; Gothland and Jutland; Ireland; mountains of Mid and South Europe (Pyrenees, Sierra Nevada, Alps, Jura, Carpathians, Balkans, near Kronstadt, Austrian Hungary, Apennines, Corsica); not unfrequently descending into the plains.

Distrib. in Ireland: Clare, Ballyvaughan (1895); *N. Colgan.* Galway, Menlough (1892); *H. & J. Groves.* Arran Isles (1852); *D. Oliver* (Phyt. 1852, p. 679, vol. iv.). Castle Taylor and Garryland (1856); *A. G. More* (as *E. gracilis* Fr. in Scottish Gardener).

MAYO, Lough Mask (1895); *E. S. Marshall.* (? ULSTER, Lough Neagh; *W. W. Newbould* in litt. Ap. 9, 1860).

The Castle Taylor and Garryland locality was given by A. G. More in the *Scottish Gardener* as for *E. gracilis* Fr., but in 1860 he suggested the name *E. Salisburgensis* in Nat. Hist. Review, vii. p. 434, and in 1866 he records it in *Cybele Hibernica* as *E. cuprea* Jord.

This species occurs on rocky limestone ground, and apparently not ascending 100 ft. above sea-level on the east coast of Ireland.

Mr. N. Colgan, in the *Irish Naturalist* (vi. p. 105, 1897), has shown that I was incorrect in stating in Journ. Bot. 1896, p. 441, that no representative of the group *Angustifoliæ* had hitherto been recorded as a native of the British Isles. It will be seen by the above records that in *Cybele Hibernica* this species was recorded under Jordan's name *E. cuprea*, but as a form of the aggregate *E. officinalis* L. Specimens were sent to Mons. Boreau, who named them *E. cuprea* Jord. I think there can be no doubt that all the Irish specimens must be referred to *E. Salisburgensis*, as small forms of that species. *E. cuprea* Jord. is also a small form, but has "ramis patulis" and flowers "roseo-lilacinæ"; the leaves and bracts are thicker than in more normal forms, and are also patent or subarcuate. The Irish plant cannot be thus characterized; it has suberect branches leaves and bracts, and the flowers are white. I have compared it with specimens named by Jordan and cannot see that it approaches them except in size.

E. Salisburgensis has a remarkably wide north and south distribution and occurs in remarkably isolated areas; particularly in its extreme north and extreme south limits. The nearest localities to Ireland in which it has been observed, and these are only three very isolated ones, are in Norway and Sweden. It does not occur again in Europe in a nearer latitude than that of the Swiss mountains. It is eminently an alpine species, and I have traced it as high as 7800 ft. above sea-level. As might be expected from its wide geographical range and its extensive range in altitude, several varieties have been noted. In damp and moist situations the leaves and bracts are usually broader, while in drier ones they are narrower. The leaves of some of the more marked varieties are figured in Tab. 363 of Journ. Bot. for 1896. The Irish plant is from 3–4 in. in height, and is branched. The leaves of the specimens I have seen from Lough Mask, Co. Mayo, are all obtuse and with obtuse teeth, and even the teeth of the lower bracts are obtuse; the leaves and bracts have only two teeth on either side, these being very short. The leaves and bracts of specimens from Menlough, Co. Galway, and from near Ballyvaughan, Co. Clare, are more normal, having from 2–3 teeth on either side, these being subpatent and even aristate.

From all species indigenous to the British Isles this may be known by its leaves and bracts having only 1–3 teeth on either side, and these being distant and patent. The only species for which it might be mistaken is *E. gracilis*, but from this it may be distinguished by its branches springing from below the middle, as well as by the character of the teeth of the leaves and bracts, and also by its bald capsule.

HYBRIDS.

E. ROSTKOVIANA × NEMOROSA Towns. *E. glanduligera* Wettst. in Mon. p. 290.

Differt ab *E. Rostkoviana* floribus minoribus, tubo corollæ calycem vix excedente, corollis circa 8 mm longis, foliis glabrescentibus obscuris ut calyces glandulis breviter stipitatis sparse obsitis; ab *E. nemorosa* capsula latiora et imprimis foliis et calycibus glanduliferis.

I found this plant in tolerable quantity on the limestone hills near Buxton, Derbyshire, in company with both parents, not far from the spot where I found the plant I have noticed as closely resembling *E. campestris* Jord. The plant has more the general appearance of *E. nemorosa* than of *E. Rostkoviana*.

As noticed by Prof. Wettstein *E. glanduligera*, in foliage and habit, has an intermediate resemblance to both *E. Rostkoviana* and *E. nemorosa*, and the Prof. accepts my determination of its being a hybrid between these two species.

E. ROSTKOVIANA × BREVIPILA. *E. notata* Towns.

Differt ab *E. Rostkoviana* caulibus et foliis omnibus calycibusque pilis longis glanduliferis et pilis brevibus rectis glanduliferis intermixtis obsitis, bracteis aristatis, floribus minoribus, tubo corollæ breviore &c. Ab *E. brevipila* caulibus et foliis omnibus calycibusque pilis longis glanduliferis plus minusve obsitis &c.

This plant seems to be not unfrequent in Scotland in localities in which both the supposed parents occur. I found it at Foyers, Inverness-shire, and at Oban, Argyllshire, both in 1881, and near Corran, Argyllshire, in 1896. The foliage varies, sometimes inclining in character to the one, sometimes to the other parent. Prof. Wettstein who has seen specimens agreed with my determination of this plant as being a hybrid, provided the suggested parents occurred in the neighbourhood, otherwise he would refer it to a var. of *E. Rostkoviana*.

E. GRACILIS × BREVIPILA. *E. difformis* Towns.

Differt ab *E. gracilis* caule infra media ramoso, foliis patentibus et opacis &c., ab *E. brevipila* caule breviore, foliis eglandulosis et setis fere nonnullis, floribus minoribus &c.

I only found this hybrid in one spot, covering about twenty square yards of moorish and rocky ground, by the River Shiel at Shiel Bridge, Argyllshire, on July 19th, 1896. The flowers were quite those of *E. gracilis*, the foliage more that of *E. brevipila*. Both these species occurred on the same ground and were abundant in the neighbourhood.

E. OCCIDENTALIS × BREVIPILA. *E. pratiuscola* Towns.

Differt ab *E. borealis* foliis calycibusque pilis glanduliferis plus minus copiosis obsitis, ab *E. brevipila* caule humiliore, spica non valde elongata, foliis colore fusco-viridia non colore graminis, corollibus plerumque minoribus.

This hybrid seems to occur frequently where the two parents are found in the same neighbourhood. It decidedly approaches *E. occidentalis* in size and in general character, but the presence of shortly stalked glands, in more or less abundance, shows its relation to *E. brevipila*. It is not unfrequent on the low pastures near to the sea in Morar Bay south of Beoraidbeg, in Scotland.

E. BREVIPILA × SCOTICA. *E. venusta* Towns.

Differt ab *E. brevipila* corollis minoribus, foliis bracteisque minoribus, et angustioribus, iis dentibus paucioribus, capsulis longioribus; ab *E. Scotica* caulibus crassis, ramis numerosis et longis, planta tota glandulosa, pilis glanduliferis brevissimis.

I found this hybrid in localities where both the parents occurred, in the neighbourhood of Poolewe in Ross-shire, where *E. Scotica* descends to within a few feet of sea-level.

E. SCOTICA × GRACILIS. *E. electa* Towns.

Differt ab *E. Scotica* floribus purpureis, labio infero labium superum excedente, ab *E. gracilis* bracteis viridiscentibus majoribus et latioribus.

I found this evident hybrid on wet slopes on the moors near and above Loch Maree Hotel, on Loch Maree (Ross-shire), where both the parent species grow together. The plant has the flowers of *E. gracilis*, but the foliage and habit of *E. Scotica*.

It will be observed that I have ventured to differ but little from Prof. Wettstein's views in the determination of species, particularly as for the most part my own observation confirms them. His opinion and demonstration that the forms which he describes as species have definite areas of distribution and that the areas of the more nearly allied species do not intercross, necessarily lead to the assumption that these forms, though nearly allied, must be looked upon as more or less established, but with less specific rank, whether species or subspecies; *E. latifolia*, *E. Foulaensis*, *E. nemorosa*, *E. curta* and *E. occidentalis* are instances. On the other hand the Professor demonstrates that forms whose areas do intercross are evidently more distantly allied and must consequently be conceded greater specific rank; *E. Rostkoviana*, *E. brevipila*, *E. gracilis*, *E. Scotica*, *E. Salisburgensis* are instances. I conceive he does not consider the time has yet come to group the species or subspecies of the genus satisfactorily, as we have yet much to learn respecting the distribution and the constancy of the characters of several of them. I perhaps somewhat prematurely attempted such grouping in my paper already alluded to in the footnote on page 322, but I do not regret having made the attempt, as the conclusions I arrived at from morphological study alone are in the main borne out or supported by those which have been so ably arrived at by Prof. Wettstein's study of areas of distribution.

ADDENDA ET CORRIGENDA.

Page 395. The brackets may be removed from 1. *E. stricta* Host, and from 7. *E. latifolia* Pursh, as it has now been ascertained that both are native. The stations for *E. stricta* Host are,—SURREY: Ockley (D 1883) det. Wettstein; near Ewhurst (1884) det. Wettstein; south-west side of Hindhead, a weak form (1884) det. Townsend; *W. H. Beeby*. NORFOLK: Fladen Fen (K. 1886) comm. Arthur Bennett, det. Townsend. YORK: Micklefield (No. 921, 1877) det. Townsend: the collector's name is not given, but I think the hand is that of Rev. H. Bromwich.

Mr. Marshall finds a very interesting plant on shell sand at Tain, ROSS, which Prof. Wettstein names *E. curta* v. *glabrescens*. The stem is more or less decumbent, 4–7 cmm long, with spreading branches, 5-toothed bracts, the teeth acuminate and shortly aristate, &c.

Page 396, line 2 from top, after 12. *E. campestris* Jord., add 13. *E. Kerneri* Wettst. and for 13, in line 4 from top read 14.

Page 402, line 18 from top, for mucula read macula, and in same page, line 7 from bottom, for the last semicolon substitute a full stop.

Page 404, line 7 from bottom, for 1846 read 1896, and line 5 from bottom, note that Ashridge Wood is in BERKS.

Page 405, line 1, omit ?.

Pages 398, 404, 405, for W. S. Millar read W. F. Miller.

EXPLANATIONS OF PLATES.

N.B.—The figures of the plants are from photographs of dried specimens, nat. size.

TAB. 374.

Euphrasia stricta Host. Lausanne, solo molassico, Sept. 9, 1869, comm. Favrat.
E. borealis Towns. Braemar, August, 1890.
E. brevipila Burnat et Gremli. Inverailort, Inverness-shire, June 15, 1896.
E. occidentalis Wettst. Morar Bay, June 28, 1897.

TAB. 375.

E. nemorosa Pers. Ashridge Wood, Berks, 1896, A. B. Jackson.
E. curta Fries. Roshven, Moidart, S. M. Macvicar, August, 1894.
E. occidentalis Wettst. Heath near Hayle, Cornwall, J. Groves, 1880 (det. Wettstein).
E. latifolia Pursh. Labrador, Thieneman, July, 1847.
E. Kerneri Wettst. Betchworth, Surrey, E. S. Salmon, Sept. 1896.

TAB. 376.

E. Foulaensis Towns. Foula, Shetland, August, 1887, W. H. Beeby.
E. gracilis Fries. Braemar, Sept. 1890.
E. Scotica Wettst. Braemar, Aug. 30, 1890.
E. Salisburgensis Funk. Near Ballyvaughan, Co. Clare, Aug. 1895. N. Colgan.

TAB. 377.

E. Rostkoviana Hayne. Rosthwaite, Cumberland, July, 1884.
E. campestris ? Jord. Near Matlock, Derbyshire, Aug. 1881, J. Groves.
E. campestris Jord. Près de Chambéry, Savoie, 1861, Schultz, Herb. Norm. Cent. 10, 930.

The drawings of the leaves, bracts, and capsules are mostly copies of those in Prof. Wettstein's Monograph.

TAB. 378.

FIG. 135–146. *E. stricta* Host.—Fig. 135–142 and 146, Tirol; Trius, collect. A. Kerner. Fig. 143–145, Klagenfurt; collect. Jabornegg. Fig. 136–137, Leaves without buds; 138 and 139, Leaves with branches in their axils. Fig. 140–145, Bracts. (From Wettst. Mon.)

FIG. 147–153. *E. borealis* (Towns.).—Braemar, Scotland; collect. Townsend. Fig. 147 and 148, Lower stem-leaves. Fig. 149, Uppermost stem-leaf. Fig. 150–152, Bracts. (From Wettst. Mon.)

FIG. 154–161. *E. brevipila* Burn. & Grem.—Carinthia, Wolliggen; collect. Packer. Fig. 154, Lowest; fig. 155, middle; fig. 156, uppermost stem-leaf. Fig. 157–160, Bracts. (From Wettst. Mon.) Fig. 162, One of the lowermost pair of leaves. Fig. 163, One of the lowermost but one pair. Fig. 163, Uppermost leaf. Fig. 164, Lowest bract. (From Loch Morar, Inverness, June, 1897.)

FIG. 169–177. *E. nemorosa* Pers.—Weimar; collect. Haussknecht. Fig. 170–172, Leaves with branches in their axils. Fig 173–176, Bracts. (From Wettst. Mon.)

FIG. 185–193. *E. curta* Fries.—Skäne Ringsjön; collect. Murbeck. Fig. 186, Primordial leaf. Fig. 187 and 188, Leaves without branches in their axils. Fig. 189, Leaf with a branch in its axil. Fig. 190–192, Bracts. (From Wettst. Mon.)

FIG. A. 1–8. *E. occidentalis* Wettst.—Fig. 1, Primordial leaf; 2–3, lower leaves; 4–7, bracts; 8, capsule.

TAB. 379.

FIG. 194–199. *E. latifolia* Pursh.—Greenland, Godthaabsfjord; collect. G. Hausen. Fig. 194, Lowest; 195, middle stem-leaf. Fig. 196–198, Bracts. (From Wettst. Mon.)

FIG. 200–204. *E. Foulaensis* Towns.—Shetland, Foula; collect. Beeby. Fig. 200, Primordial leaf. Fig. 201, Middle stem-leaf. Fig. 202 and 203, Bracts. (From Wettst. Mon.)

FIG. 216–222. *E. gracilis* Fr.—Småland. Barkeryd; collect. Moutelin. Fig. 217, Primordial leaf. Fig. 218, Leaves without branches in their axils. Fig. 219, Leaf with a branch in the axil.

FIG. B. 1–7. *E. Scotica* Wettst.—1, Primordial leaf. 2, Next leaf above. 3, Uppermost leaf. 4, Lowest bract. 5–6, Bracts. 7, Capsule. (From Wettst. Mon.)

FIG. 301–313. *E. Rostkoviana* Hayne.—Fig. 301–308 and 313, Skania, Kjeflinge; collect. Murbeck. Fig. 302 and 203, Lower branchless leaves. Fig. 304–306, Middle and upper stem-leaves with branches in their axils. Fig. 307 and 308, Bracts. Fig. 309–312, Laus bei Innsbrück; collect. A. Kerner. Fig. 309, Upper stem-leaf. Fig. 310–312, Bracts. (From Wettst. Mon.)

TAB. 380.

FIG. C. 1–8. *E. campestris* Jord.—1, Primordial leaf. 2, Leaf next above. 3, Lowest leaf. 4–7, Bracts. 8, Capsule.

FIG. 326–336. *E. Kerneri* Wettst.—Fig. 326–331 and 336, Budapest; collect. Borbás. Fig. 327, Lowest stem-leaf without branch. Fig. 328, Upper stem-leaf with branch. Fig. 329–331, Bracts. Fig. 332–335, Soos, Nieder-Oesterr.; collect. H. Braun. Fig. 332, Upper stem-leaf. Fig. 333–335, Bracts. (From Wettst. Mon.)

FIG. 1–29. *E. Salisburgensis* (Funck).—Fig. 1–9 and 29, From a specimen from the original station (Salzburg). Fig. 2, Primordial leaf. Fig. 3 and 4, Leaves with branches in their axils. Fig. 5, Branchless stem-leaves. Fig. 6–9, Bracts. Fig. 10–13, Bracts of a specimen from a very warm,

dry and relatively low station (Vöslau in Nieder-Oesterr.). Fig. 14–17, Bracts from a specimen from the northern part of the area of distribution (Gotland). Fig. 18–21, Bracts of a specimen from the subalpine region (Baumgartner Haus am Schneeberg in Nieder-Oesterr.), passing into v. *nivalis*. Fig. 22–25, Bracts of v. *nivalis*, from an original specimen. Fig. 26–28, Bracts of an abnormal specimen (Rauriserthal). (From Wettst. Mon.)

NOTES ON CRASSULA.

By James Britten, F.L.S., and Edmund G. Baker, F.L.S.

I.—Species described by Thunberg in *Nova Acta*, 1778.

The revision of the older specimens of the *Crassulaceæ* in the National Herbarium has brought to light certain details concerning them which may as well be put upon record. Many of these specimens bear an intimate relation to the species described by Thunberg in an important paper published in 1778 in the *Nova Acta Acad. Cæs. Leopoldino-Carolinæ*, vi. 328-341, entitled "Crassulae Generis xxviii. Novas Species in Capite bonæ spei detectas et descriptas." This paper seems to have been overlooked by almost all recent writers, who have cited most of the species contained in it as from the *Supplementum Plantarum* of the younger Linnæus. This is not to be wondered at, for Thunberg's name in the *Supplementum* is placed at the end of the much-abridged description of each species, and is thus not recognized as being also the authority of the specific names. Much of the obscurity that attaches to many of the species is due to the brevity of Linnæus's diagnoses, and disappears when Thunberg's fuller descriptions are consulted.

Mr. Jackson, in the *Index Kewensis*, follows the ordinary course of attributing these species of Thunberg to later works of the same author, or, in most cases, to Linn. fil. This it is difficult to understand, because in two instances the paper in the *Nova Acta* is cited, showing that Mr. Jackson was aware of its existence. Harvey quotes the species from various places—the *Supplementum*, Thunberg's *Flora Capensis*, or Aiton's *Hortus Kewensis*; many he fails to identify. Yet as Thunberg's paper was printed in (if not before) 1778, and the *Supplementum* dates from 1781, it is manifest that the names stand on the authority of the former.

The importance of the Museum specimens is twofold. In the first place, many of the Herbarium sheets are written up by Dryander with Thunberg's names, and references to his descriptions in the *Nova Acta;* and Dryander had a share in working out the *Crassulaceæ* for the *Hortus Kewensis*. But, in addition to the dried plants, we have an excellent series in spirits from Kew Gardens, and these are labelled by Dryander with a reference to the number of each in the *Hortus Kewensis*, for which they are absolutely typical; the novelties published in that work will be dealt with later. Secondly, the dried specimens were sent to Banks and the living ones to Kew in 1774 by Francis Masson, who in that year was travelling with Thunberg,* so that his gatherings were doubtless to a considerable extent identical with Thunberg's.

A considerable number both of Thunberg's and of Aiton's Crassulas are relegated by Harvey to an appendix of "species unknown to us." Why the British Museum Herbarium was not consulted by Harvey it is not easy to explain; the neglect is rendered more serious by the recent action of Dr. Schönland, who, in his paper on "Some new species of *Crassula* from South Africa,"† justifies Harvey's action in the ignoring of "incompletely characterized species of older authors." "I regret," says Harvey (Fl. Cap. ii. 332) "being obliged to leave so many species of older authors undetermined; but as most of them have been named in gardens, have never been figured, are not contained in any Herbarium, and have been scarcely more than indicated by the curt descriptive phrases of Haworth, it is quite impossible to make them out satisfactorily." We have already noted that Harvey overlooked the full descriptions of Thunberg in the *Nova Acta;* it is to be hoped that Dr. Schönland will consult these and the plants in the National Herbarium before he publishes further papers on *Crassula.*

It may be well in the first instance to give a list of the twenty-eight species, with references to the original description and to their position in the *Index Kewensis.* We have arranged the names alphabetically for convenience of reference.

Thunberg in *Nova Acta*, vi. (1778).		*Index Kewensis.*
adscendens	*l. c.* p. 341	Same reference.
alpestris	,, 336, tab. V b, fig. 4	Linn. f. Suppl. p. 189
argentea	,, 337	,, ,, 188
barbata	,, 332	,, ,, 188
capitella	,, 339	,, ,, 190
cephalophora	,, 333	,, ,, 190
columnaris	,, 335	,, ,, 191
corallina	,, 334	,, ,, 188
cordata	,, 330	= neglecta
Cotyledonis	,, 332	Linn. f. Suppl. 190
crenulata	,, 339	,, ,, 189
deltoidea	,, 334	,, ,, 189
hemisphærica	,, 331	Thunb. Prodr. 57
mollis	,, 340	Linn. f. Suppl. 189
montana	,, 332	,, ,, 189
perforata	,, 338	,, ,, 190
pubescens	,, 340	,, ,, 190
pyramidalis	,, 335, tab. V b, t. 3.	,, ,, 189
ramosa	,, 341	Ait. Hort. Kew. I. i. 390
retroflexa	,, 338	Linn. f. Suppl. 188
rupestris	,, 337	,, ,, 189
spatulata	,, 330	Thunb. Prodr. 57

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* See Journ. Bot. 1884, 115.

† Journ. Linn. Soc. (Bot.), xxxi. 546.

Thunberg in *Nova Acta*, vi. (1778).		*Index Kewensis.*
spicata	*l. c.* p. 333	Linn. f. Suppl. 189
tecta	,, 331	,, ,, 190
thyrsiflora	,, 339	,, ,, 190
tomentosa	,, 333	,, ,, 190
Turrita	,, 336	Thunb. Prodr. 55
vestita	,, 335	Linn. f. Suppl. 188

The following notes and descriptions of some of the species which have been regarded as obscure are drawn up from the material in the British Museum, which has been collated with Thunberg's descriptions in the *Nova Acta* and with Solander's and Dryander's MSS. Where no notes are given, the plant must, so far as we are concerned, remain obscure; but Thunberg's full descriptions should not be overlooked by future workers at the genus:—

CRASSULA ADSCENDENS. De Candolle (Prodr. iii. 390) notes that this name is not taken up by Thunberg either in his *Prodromus* or in his *Flora Capensis*, and must therefore remain doubtful.

C. ALPESTRIS. Specimen from Masson in herbarium. Stem stout, erect, branched above, 3–4 in. high. Leaves connate, broad at the base and clasping the stem, ovate, acuminate, concave, entire, closely imbricating. Flowers terminal, capitate. Capitula several, peduncled, and, as Thunberg states, "piso majora." Petals terminating in long channelled points.

Bockefeld, Boeckland, and Roggefeld (Thunberg).

Masson's specimen agrees well with Thunberg's figure and description, both of which are cited by Dryander in his determination of Masson's plants in Herb. Banks. *C. alpestris* Harv. (Fl. Cap. ii. 341), founded on a specimen from Drège labelled "*Crassula alpestris* Th. ? α," is an entirely different plant, belonging to the *Eu-Crassula* section; if it be not identical with any subsequently described species, it may be called *C. Harveyi;* it is, as may be inferred from its position in the sequence of species in the *Flora*, closely allied to *C. sarcocaulis* E. & Z.

C. BARBATA. We have specimens from Masson, identified by Dryander with Thunberg's plant. Harvey cites it from Thunberg's Fl. Cap. 292.

C. CAPITELLA. This is placed by Harvey among the species unknown to him; he misprints the name "*capitellata*." We have specimens in the herbarium and in spirit, raised in Kew Gardens (1774–75) from seeds from the Cape, and typical for Solander in Ait. Hort. Kew. i. 394, who cites Thunberg's description. Stem erect, glabrous, terete, about 8–10 in. high, about the thickness of a pen, and above sometimes branched. Leaves connate, lorate-lanceolate, acute, ciliate, longer than the internodes, basal leaves 3½–4 in. long. Flowers verticillate, white, verticels sessile or subsessile, many-flowered, crowded close together above, rather laxer below. Sepals lanceolate, acute, shorter than the petals.

Seems to be closely allied to *C. Turrita* Thunberg.

C. CEPHALOPHORA. Specimen in herbarium from Masson, written up by Dryander with reference to Thunberg's paper. Flowering stem terete, erect, thinly grey, subtomentose, 12–18 in. high. Leaves in a basal rosette, lanceolate-oblong, acute or subobtuse, erect or erecto-patent, tomentose, $\frac{1}{2}$–$\frac{3}{4}$ in. long, entire; this slightly differs from Thunberg's description, which calls the leaves linear or linear-oblong and obtuse: Harvey has a var. *latifolia*, to which Masson's specimen should probably be referred. Flowers in lateral, globose, pedunculate heads, peduncles often about $\frac{3}{4}$ in. long; at the base of the 2–3 peduncles, springing from the same point on the stem, are 2–3 triangular or oblong tomentose bracts. Diameter of heads of flowers $\frac{1}{3}$–$\frac{1}{2}$ in.

Agrees in every respect with *Globulea canescens* Haworth (Syn. Pl. Succ. 65 (1819)) = *Crassula canescens* Roem. & Schultes, *Systema*, vi. 734 (1820)—the name retained by Harvey, which must be replaced by *cephalophora*—and with a specimen named by Harvey from Uitenhage, No. 993.

C. COLUMNARIS. Specimens in the herbarium from the Cape (Masson), and in spirit, identified by Dryander with Thunberg's plant.

C. CORALLINA. Specimen in herbarium from Masson, named by Solander, and referred by Dryander to Thunberg's description. A dwarf dichotomously branching plant with opposite, sessile, distinct, carnose, entire, punctate leaves, which are 1–2 lines long; the white pulverulent character of the extremities of the leaves noticed by Thunberg is very apparent. It is not in flower, but is certainly identical with *C. dasyphylla* Harvey, based upon Drège No. 6885, with which we have compared it. Thunberg's plant was from "campis siccis Hantum inter Daunis et Roggefeldsberg"; *C. dasyphylla* Harv. was gathered by Drège "at Winterveld between New Year's Fountain and Ezelsfont."

C. CORDATA. Roemer & Schultes (Syst. Veg. vi. 722) point out quite correctly that Thunberg's plant (which we know only from description) differs from that described in Ait. Hort. Kew. i. 396. They proceed, however, to give Thunberg's species a new name—*neglecta*, retaining *cordata* for Aiton's plant. This is of course contrary to the law of priority, in accordance with which Thunberg's plant must retain the name *cordata*, and a new name must be found for the *cordata* of Aiton: this we propose to call *Aitoni*. The synonymy will be—

C. CORDATA Thunb. in Nov. Act. vi. 330 (1778); Linn. f. Suppl. 189 (1781).
C. neglecta Roem. & Schultes, *l. c.*
C. AITONI.
C. cordata [Dryand. in] Ait. Hort. Kew. i. 396 (1789); Harv. Fl. Cap. ii. 347, et auct. plur., non Thunb.

C. MOLLIS. There is a specimen in the herbarium from Masson, unfortunately without leaves, and there are also rather fragmentary spirit specimens. The inflorescence is paniculate, and at the base of the pedicels are two opposite bracts. The sepals are blunt and shorter than the sepals.

"Cannaland, ad Lange Kloof" (Thunberg).

It is the *Globulea mollis* of Haworth, and is taken up under that name by DeCandolle (Prodr. iii. 392), whose diagnosis is cited by Harvey among his "species unknown," with no reference to Thunberg's original description. Dryander (in Solander MSS.) says:—"Planta nostra ex horto Kewensi in omnibus cum descriptione Thunbergii convenit, præter caulem vix angulatum, ut Thunb. suam describit."

C. MONTANA. In herbarium from Masson, written up as Thunberg's plant by Dryander. Unknown to Harvey. Cæspitose. Leaves radical, ovate, acute, thin, concave, ciliate on the edge, glabrous. Flowering stem erect, slender, about ¾ in. high, bearing about ¼ in. from the head of flowers two connate, ciliate bracts. Flowers capitately congested.

"In summo monte Bockland" (Thunberg).

Closely allied to *C. Cooperi* Regel, *Gartenflora* (1874), 36, t. 786, and *C. curta* N. E. Brown in *Kew Bulletin*, 1895, 145.

C. PYRAMIDALIS. A specimen from Masson of this plant is referred by Dryander to Thunberg's description and figure, with which it exactly corresponds.

C. RAMOSA. We have in the Herbarium the type of *C. ramosa* Hort. Kew., which does not appear to be Thunberg's plant. We shall deal with this later when considering Aiton's plants.

C. TOMENTOSA. We have three specimens from Masson named by Dryander, and referred by him to Thunberg's description, from which they do not materially differ. Thunberg collected it at Hantum—a locality not cited by Harvey. The specimens from Namaqualand (Whitehead) representing this species in Harvey's herbarium differ widely from Masson's plant, being taller and of stouter habit, with a branched inflorescence (branches ⅓–½ in. long) and markedly striate stem. On the same sheet with this is a plant from Wallich, possessing all these characteristics in more extreme forms; this, however, is not cited in the *Flora*. We are of opinion that Masson's plant accords better with Thunberg's description than either of the foregoing, and that the plant described by Harvey is different; but the final settlement of this question may be left to a future monographer.

II.—SPECIES DESCRIBED IN AITON'S 'HORTUS KEWENSIS,' 1789.

The plants described in Aiton's *Hortus Kewensis* are, we think, rightly cited as of "Ait.," except in the cases where Robert Brown is distinctly mentioned as the authority, *e.g.* in *Cruciferæ*. It is of course well known that Solander and Dryander were largely responsible for the botany of the work, but their names do not appear on the title-page or in connection with any definite species, and it is impossible to tell in every case which of the two is responsible. It has been supposed that Solander collaborated in the first edition, and Dryander in the second, and this is true; but it is also clear that Dryander helped in the former, and Mr. Jackson—see under *Conyza ægyptiaca* in the *Index Kewensis*—recognizes this fact. The relative portions attributable to each may be ascertained by referring to the Solander MSS., and to the plants in the British Museum Herbarium, where, as is known, the types of the *Hortus Kewensis* are preserved. Dryander made numerous additions to Solander's notes, and the plants in the herbarium are often written up by him. Mr. J. J. Bennett's statement in the preface to vol. ii. of Brown's *Collected Works* seems to give colour to the supposition that Solander was responsible for the first edition*; but the younger Aiton, in the often overlooked postscript at the end of vol. v. of ed. 2 (pp. 531–2), says expressly that Dryander "continued to the son the assistance given to his father during the publication of the former edition of this work." Solander died in 1782, and the first edition did not appear until 1789. Mr. Boulger, in the *Dictionary of National Biography*, refers to Dryander as the "main author" of this edition.

The following notes and descriptions are based upon the types preserved in the herbarium and in spirit at the British Museum. The names of the species, as well as the numbers which they bear in Aiton, are written on the labels of the spirit specimens by Dryander. We have been guided by the Solander MSS. and the labels of the specimens in assigning the species to Solander and Dryander respectively.

C. ALOOIDES [Solander in] Aiton, Hort. Kew. i. p. 394, No. 17! Specimens from Masson in herbarium and from Hort. Kew., where it flowered in 1778, in spirit. The herbarium specimens, named by Solander *alooides*, were subsequently doubtfully referred by him to *orbicularis*—a doubt also expressed in his MS. description. Leaves in the herbarium specimen all basal, rosulate, distinct, imbricating, broadly ovate, fleshy, glabrous, according to Solander covered with minute impressed red dots, about 1–1½ in. long, rather more broad. Peduncle scape-like, leafless (the cultivated specimen has three pairs of ovate stem-leaves), about 4–6 in.; cymes densely fascicled, as in *C. orbicularis*, in an interrupted thyrsus; fascicles 7–9 opposite, shortly peduncled. Sepals glabrous, about 1 line long. Petals about three times longer than the calyx, "white, virescent below." Filaments white. Anthers subrotund, small.

Closely allied to *C. orbicularis* L., but the leaves are broader, and there are more opposite fascicles in the inflorescence. This is placed by Harvey among the species unknown to him.

Mr. N. E. Brown, in the *Kew Bulletin* for 1896, p. 161, described a different species under the name *aloides*, founded on *Rehmann*, No. 6375, which, however, had previously been described by Dr. Schinz in *Bull. Herb. Boissier*, ii. 204, as *C. acinaciformis*.

C. CILIATA L. Sp. Pl. 283; Ait. *l.c.* 394, No. 19! We have specimens in spirit from Hort. Kew., and others in the herbarium collected at the Cape in 1771 by Banks and Solander.

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* "On the portion of the second edition printed after the death of Dryander in 1810, he [Brown] bestowed the same attention which had been devoted by Dryander to the earlier portion, and by Solander to the first edition," *l. c.* vi.

C. EXPANSA [Dryander in] Aiton, *l. c.* i. 390, No. 4! Specimens in spirit. Stem herbaceous, angled, internodes about $\frac{1}{2}$–$\frac{2}{3}$ in. long, much branched, diffuse, glabrous. Leaves subconnate, spreading or recurved, narrow-oblong or oblong-lanceolate, subterete, fleshy, convex below, slightly channelled above, $\frac{1}{2}$–$\frac{2}{3}$ in. long. Flowers axillary, solitary or in twos or threes, terminal subcymose; pedicels occasionally reaching 1 in. long, but mostly much shorter. Sepals nearly as long as the spreading corolla, linear, blunt, with obtuse interspaces. Petals elliptic-oblong, subacute. Styles shortly subulate.

C. IMBRICATA [Solander in] Aiton, *l. c.* 393! (1789). The type specimens in the herbarium (from Masson) and in spirit leave no doubt as to the identity of this plant with *C. lycopodioides* Lam. *Dict.* ii. 173 (1786), to which Harvey and others refer it.

C. LINEOLATA [Dryander in] Aiton, *l. c.* 391, No. 8! DC. Prod. iii. 390, who omits, apparently by accident, to refer to Hort. Kew., from which his description is taken. Specimens in the herbarium (Thunberg) and in spirit (Hort. Kew., from Masson). Stem herbaceous. Leaves ovate-cordate, apex apiculate, sessile, shorter than the internodes when dry; lamina is pellucid, and has linear purple lines; bases of opposite leaves sometimes overlapping, but not joined, as in *C. marginalis* Aiton. Peduncles subterminal, slender. Sepals lanceolate. Petals pointed, longer than the sepals.

Comes between *C. centauroides* Linn. *Pl. Afr. Rar.* p. 9 (1760) and *C. brachypetala* E. Meyer. Judging from his specimens, this seems to be the plant Harvey had in view when he described his *C. centauroides* L. *β marginalis*. It differs from *C. marginalis* Aiton in several important particulars, as will be seen from the following description. *C. lineolata* differs from *C. brachypetala* in the broader and sessile leaves, and in the sepals, which are shorter than the petals. This species is entirely omitted by Harvey.

C. MARGINALIS [Dryander in] Aiton, *l. c.* 396, No. 25! Spirit specimens from Hort. Kew. Stem copiously branching, terete, glabrous, thickening at the nodes; internodes generally about $\frac{2}{3}$–$\frac{3}{4}$ in. long. Leaves sessile, connate, patent, orbicular-cordate, acute or cuspidate, thick and fleshy, very slightly convex above, more so below, with a narrow chestnut-coloured border on the upper surface, within which is a series of dark-coloured points, lamina often about $\frac{1}{2}$ in. long; leaves near the inflorescence smaller. Flowers in capitate peduncled cymes, which are subtended by two small fleshy connate bracts; pedicels $\frac{1}{4}$–$\frac{1}{3}$ in. long. Sepals linear acute, half as long as the petals. Petals ovate, subacuminate, nearly $\frac{1}{4}$ in. long. Stamens hardly exceeding the styles. Carpels 5, ovoid; styles subulate, diverging.

This plant is well figured by Jacquin (Hort. Schoenbr. t. 471); it has been considered by Harvey as a variety (*β marginalis*) of *C. centauroides*, but it seems to us distinct. Harvey under his var. *β marginalis* quotes Herb. Drège 6889, but in this plant the leaves are longer and narrower than in the type. *C. prostrata* E. Meyer, quoted under this variety by Harvey, is also cited by him as *Bulliarda Dregei*. Thunberg's plant of the same name is no doubt different, as stated by Harvey, but we can throw no light upon it.

C. profusa Hook. fil. (Bot. Mag. t. 6014) seems to be a form of *C. marginalis*, having the leaves less connate than in the type.

C. OBLIQUA [Solander in] Aiton, *l. c.* 393! non Andr. Bot. Rep. t. 414. Specimen in herbarium named by Solander, in whose MSS. is a description by Masson, who found it in gardens at Ronde Bosch. Stem shrubby, angled when dried, according to Solander 4 ft. high, divaricate, geniculate. Leaves opposite, distinct at base, patent or subpatent, ovate, sessile, flat on both sides, 1–1¼ in. long, subacute, fleshy, glabrous, margins cartilaginous, punctate. Cyme corymbose paniculate, trichotomous, shortly pedunculate (according to Solander white) flowers. Involucre 2-leaved; leaves connate. Calyx cup-like. Sepals broadly deltoid. Petals oblong-lanceolate, mucronate, concave. Styles subulate.

The above agrees fairly well with the description of the earlier *C. portulacea* Lam., to which Harvey refers it in the *Flora Capensis*. The flowers in the plant from Hort. Kew. are said to have been white, not rosy, as stated by Harvey, and the spaces between the calyx teeth are not so wide.

C. RAMOSA [Dryand. in] Ait. Hort. Kew., ed. 1, i. 390! Judging from Masson's specimen—the type of Dryander's description—this is not *C. ramosa* of Thunberg, nor does it seem to be the "*C. ramosa* Ait.? fide E. & Z." of Harvey—a plant which unfortunately is not in Harvey's herbarium. It agrees in the main with *C. densifolia* Harvey, but has somewhat longer leaves and larger bracts: the type specimen of *C. densifolia* hardly affords sufficient material to justify us in uniting the two, though the point must be considered by future monographers of the genus. Plants collected by Banks and Solander at the Cape seem identical with *C. densifolia*. The following description of *C. ramosa* is drawn up from the type of Dryander's description:—Stem erect, shrubby, terete, branched. Leaves connato-perfoliate, subulate, trigonous, much longer than the internodes, but under 1 in. long, fleshy, tapering to a sharpish point, slightly channelled above, glabrous. Cymes terminal, pedunculate, corymbose, many-flowered, peduncle 4–5 in. long. Bracts opposite, connate, subacuminate, lower bracts 2 lines long. Sepals ovate, glabrous, acute or subacute, about one-third as long as the petals. Petals about 1 line long, obovate or obovate-oblong. Styles subulate.

C. SPARSA [Dryander in] Aiton, *l. c.* 395! Not referred to by Harvey. Specimens in spirit from Hort. Kew. (Masson), 1774. Leaves alternate, thick, oblong-lanceolate or broadly strap-shaped; apex acute, glabrous, upper surface flat, rounded below, often about 1¼–1½ in. long. Panicle about 6 in. long, subsecund, branches terete, glabrous, erecto-patent, simple or forked. Flowers pedicellate; pedicels shorter than the flower or very rarely equalling length of flower. Bract at base of pedicels lanceolate, acute, concave.

Sepals broadly lanceolate, acute, glabrous, about half the length of the petals. Petals apiculate at the apex. Stamens 10, subincluded. Carpels longer than the sepals, points subulate.

This appears to be a Cotyledon of the Paniculatæ section with alternate leaves. We are unable to match this with any of the species enumerated by Harvey; should it not have been described under *Cotyledon* it will retain the name *sparsa*.

III.—MISCELLANEOUS NOTES.

Two or three small points have occurred incidentally during our work, which may as well be recorded here.

The following is a description of a species which we do not find in the British Museum, Kew, or Dublin herbaria, and which we believe to be new:—

Crassula Massoni, sp. n. Caulis erectus, simplex, herbaceus, glaber, 8–10 poll. alt., inferne foliis tectus; foliis triangularibus sessilibus connato-vaginantibus, apice acuminatis crassis imbricatis, internodiis longioribus margine ad apicem integris basin versus ciliatis vel subciliatis, circiter ⅓ poll. longis; cymulis in axillis foliorum superiorum breviter pedunculatis vel subsessilibus, spicam interruptam quasi formantibus; sepalis lanceolatis subobtusis ciliatis, 1–1½ lin. longis, petalis multo brevioribus; petalis inferne coalitis, superne in apicem longam et canaliculatam attenuatis; stigmate subsessile.

Hab. Africa australis, *Masson*!

Root branching. Stem erect, unbranched, 8–10 in. high, about the thickness of a pen, glabrous, ridged for a short distance below middle of each leaf. Leaves closely imbricating below, becoming sparser above when subtending the flowers, sessile, connate, triangular, from a broad clasping base tapering to an acuminate point, in four rows, rather thick, concave, longer than the internodes. Cymules sessile or shortly peduncled in the axils of leafy bracts, somewhat in the same manner as in *C. Turrita*. Sepals lanceolate, subobtuse, much shorter than the petals, rather thick, 1–1½ lines long, ciliate. Petals much longer than the calyx, tapering above into long narrow subulate channelled points.

In the character of the petals this plant agrees with the section *Sphæritis*, but the leaves are imbricated loosely, and apparently in four rows, thus approaching the section *Pyramidella*.

Allied to *C. alpestris* Thunb. (non Harv.), differing in the character of the inflorescence.

C. PELLUCIDA L. Sp. Pl. 283 (1753). This plant was founded by Linnæus on a figure and description in *Dill. Hort. Eltham.* (t. 100, p. 119), which Harvey cites under *C. centauroides*. *C. pellucida* is quoted by Harvey (under his *C. Sarcolipes*) as of Thunberg, but the name is said by him to be generally given to a state of *C. centauroides*. The two species are retained as distinct in Sp. Pl. ed. 2, 404, 406; if they are identical, *C. pellucida* must take precedence, as *C. centauroides* was not published until later (*Pl. Rariores Africanæ*, p. 9 (1760)).

C. CAPITATA Lam. Encyc. ii. 171 (1786). This plant is omitted altogether by Harvey. It is referred by Mr. Jackson in the *Index Kewensis* to *C. cymosa* Berg. Judging from the description, it must be very nearly allied to, if not identical with, *C. Sphæritis* Harvey, which has much the habit and foliage of *cymosa*, but differs in inflorescence and petals. In the section *Sphæritis* the petals are "panduriform, tapering above into long narrow channelled points," while in *cymosa* they are "oblong-spathulate subobtuse." Lamarck in his description says, "Je ne sais si cette plante diffère beaucoup du *Crassula cymosa*," but describes the petals of his *C. capitata* as "un peu étroits et presque linéaires dans leur partie supérieure."

In the collection of very beautiful drawings with which Jacquin used to adorn his correspondence with Dryander is one of his *C. Umbella*, subsequently published in his *Icones*, t. 352 (*Collectanea*, iv. 171). We have also a type specimen of his *C. Cotyledon* from the Vienna Garden, described and figured in his *Miscellanea*, ii. 295, t. 19 (1781).

A number of the names quoted by Walpers (Repert. ii. 252-4 (1843)) are retained in the *Index Kewensis*, although a reference to Harvey's *Flora Capensis* shows that they are synonymous with other species. Harvey, who does not seem to have referred to Walpers, attributes some of these to "E. & Z.," although it is clear that Endlicher was the first to place them under *Crassula*. It may be well to give a list of these species, showing how they stand in the *Flora Capensis*, in which Endlicher's names are not quoted, and also how they should be cited. We have followed Harvey in the limits assigned to the various species:—

Names in Walp. Repert. ii. 252-4, published as of Endlicher's MSS.	Names in Harvey's 'Flora Capensis.'	Names to be retained.
C. alpina	Bullardia alpina *Harv.*	Bulliarda alpina *Harv.*
C. campestris	Crassula campestris *E. & Z.*	Crassula campestris *Endl.*
C. furcata	C. ericoides *Harv.*	C. ericoides *Harv.*
C. lanceolata	C. campestris *E. & Z.*	C. campestris *Endl.*
C. littoralis	C. lycopodioides *Lam.* γ obtusifolia *Harv.*	C. lycopodioides *Lam.* γ obtusifolia *Harv.*
C. nemorosa	C. nemorosa *E. & Z.*	C. nemorosa *Endl.*
C. nivalis	C. nivalis *E. & Z.*	C. nivalis *Endl.*
C. parvula	C. parvula *E. & Z.*	C. parvula *Endl.*
C. patens	C. patens *E. & Z.*	C. patens *Endl.*
C. Petrogeton *Walp.*	C. dentata *Thunb.*	C. dentata *Thunb.*
C. polpodacea	C. lycopodioides β polpodacea *Harv.*	C. lycopodioides β polpodacea *Harv.*
C. propinqua	C. lycopodioides γ obtusifolia *Harv.*	C. lycopodioides γ obtusifolia *Harv.*
C. quadrangula	C. pyramidalis *Thunb.*	C. pyramidalis *Thunb.*
C. sediflora	C. sediflora *E. & Z.*	C. sediflora *Endl.*

We have to thank Prof. Perceval Wright for his kindness in sending us the Crassulas from Harvey's herbarium, which have materially assisted us in our determinations.

NEW NATAL PLANTS.

DECADE II.

By J. Medley Wood, A.L.S., and Maurice S. Evans.

(Continued from p. 353.)

11. **Hypericum natalensis**, sp. n. Caules multi ex radice lignosa, 6–15 poll. alti, erecti, teretes, glabri; folia ovata, obovata vel oblonga, obtusa apice, basi rotundata, subsessilia, glabra, plana, pellucido-punctata, venosa, 3–8 lin. longa, 1½–4 lin. lata; cymæ dichotomæ; sepala oblonga, integra, pellucido-punctata, submucronata, 3 lin. longa; petala ovato-oblonga, non nigro-punctata, sepalis longiora; styli 5, liberi usque ad basin; flores lutei.

Habitat. Natal. Near bank of Mooi River, 4–5000 ped. alt., October; *J. Medley Wood*, No. 4034.

A much-branched undershrub, usually growing in dense clumps from a perennial root (?). Only known to us from the upper districts of the colony, and having much the appearance of *H. æthiopicum* Thunb., for which species it has doubtless been mistaken; but it differs in having more numerous stems from the root, thus forming larger clumps; leaves which are subsessile and not amplexicaul, flat not revolute edges, sepals which are not lanceolate nor acute; in the absence of black dots from sepals, petals, and anthers, and by its five styles and 5-celled capsule.

12. **Buchenrœdera sparsiflora**, sp. n. Suffruticosa, infra 6 poll. alta, multo ramosa; rami divaricati, juvenes sericei; folia conferta in parte superiore ramorum, 1½ lin. longa, petiolo foliolis subæquante; foliola cuneata, mucronulata, confertim denseque sericea; stipulæ lineari-oblongæ, acutæ, petiolo subæquantes; flores solitarii, axillares terminalesque; pedunculi 1–1½ lin. longi; calyx 3 lin. longus, sericeus foliis similis, lobis deltoideis tubo brevioribus; bracteæ lineares, calyce breviores; vexillum sericeum externe, alis carinaque longius; legumen pilosum, bis vel ter longius calyce; flores atro-purpurei.

Habitat. Natal. Summit of Bushmans River Pass, 8–9000 ped. alt., April; *M. S. Evans*, No. 716.

Differs from *B. tenuifolia* E. & Z. in inflorescence, and probably in relative length of vexillum, also in indument; from *B. trichodes* Presl in indument, shape of leaflets, length of bracts and vexillum, and also in inflorescence.

13. **Crotalaria dura**, sp. n. Herbacea, erecta, parce ramosa, pubescens; folia trifoliolata, petiolata, foliolis variantibus ex oblanceolatis ad lineari-oblonga, mucronulatis, minute spisseque punctatis superne, subtus pubescentibus, terminalibus 7–9 lin. longis, lateralibus 6–7 lin. longis; petioli 3–6 lin. longi, petioluli ½–¾ lin. longi; stipulæ 0; inflorescentia terminalis in caulibus ramisque; racemi laxe pauciflori; tubus calycis turbinatus, 1–1½ lin. longis, lobis subulatis, tubo longioribus; bracteæ lineares tam longæ quam pedicelli; vexillum suborbiculatum, alæ angusto-

oblongæ, carina late falcata; stylus falcatus, pubescens in dimidio superiore; legumen obliquo-oblongum, vel elliptico-oblongum, cum reliquis styli persistentis, villosum, valvis duris cornieisque; semina 4?; flores lutei.

Habitat. Natal. Amongst grass on hill-side, Noodsberg, 2–3000 ped. alt., Nov.; *J. M. Wood*, No. 385. Same locality, *J. M. Wood*, No. 4134; 5278, April; without locality, *W. T. Gerrard*, No. 172?

Amongst South African species this appears to be nearest to *C. globifera*, but differs from it in indument, shape and size of leaves, number of flowers, shape, texture and indument of legume, which is much more oblique than that of *C. globifera*.

14. **Printzia densifolia**, sp. n. Caulis ?, rami teretes, furfurosi; folia alterna, numerosissima versus superiorem partem caulis, ovata, acuminata, rotundata basi, acriter profunde et distanter serrata, breviter petiolata, auriculata, glabra supra, minute pubescentia in venis infra, 1–3 poll. longa, ¾–2 poll. lata, auriculo folioso, subrotundo ex basi lata, serrato folio simili, 4–5 lin. diam.; inflorescentia axillaris terminalisque in brevibus racemis paucifloris; capitula 6 lin. longa; squamæ involucrales imbricatæ in 4–5 seriebus, exteriores breviores, omnes lanceolatæ, longis pilis lanatis fimbriatæ præsertim apice, radii 4–5 lin. longi; pappus albus; fl. albi.

Habitat. Natal. Blinkwater, near York, 3–4000 ped. alt., April, 1890; *J. M. Wood*, No. 4331.

This is a species quite distinct in general appearance from any other known to us. As in *P. auriculata*, the leaves are amply auricled, but in shape and indument they are quite different. From *P. pyrifolia* it differs in shape and size of leaves, conspicuous auricles, and total absence of tomentum on under side of the leaves.

15. **Heteromma simplicifolia**, sp. n. Caulis herbaceus, striatus, pilosus, 2–2½ ped. altus, 1–2 lin. diam., ramis diffusis; folia pauca alterna, inferiora decurrentia, angusto-oblongo, mucronata, gradatim coarctantia petiolo alato, margine acriter dentato, dentibus paucis, 1–2 poll. intervallis, 2–4 poll. longa, petiolum includentia, ½–¾ poll. lata, superiora lineari-oblonga, sessilia et subamplexicaulia, omnia pilosa, subscabra, tenuiter ciliata, et diminuentia versus apicem caulis ramorumque; corymbus laxe paniculatus; capitula 20–30-flora; squamæ involucrales pilosæ; achenia juvenia minute pubescentia; flores lutei.

Habitat. Natal. Drakensberg Mts. near Polela river, 6–7000 ped. alt., February, 1896; *M. S. Evans*, No. 648.

This genus, as far as known to us, consists of two species only; *H. decurrens*, which inhabits the mountainous parts of Cape Colony, and the present species, which differs in shape and cutting of leaves, looseness of corymb, and number of florets in the head.

16. **Eumorphia sericea**, sp. n. Suffrutex erectus, ramosus, 18 poll.–2 ped. altus; rami lignosi, teretes, arachnoidei, veteriores subglabri; folia fasciculata, fasciculis oppositis, utroque fasciculo 5–10 folia linearia, integra, sericea continente, 2–6 lin. longa;

capitula solitaria apice ramulorum, 3 lin. longa, 4–5 lin. lata; squamæ involucrales in pluribus seriebus, imbricatæ, erectæ, sericeæ, cum latis marginibus membranaceis; receptaculum convexum, paleis onustum; paleæ membranaceæ, achenia juvenia amplectentes; radii ligulati, 3-dentati, 5–7 lin. longi, roseo-albi; disci tubulosi, 5-dentati, tubo dilatato in parte superiore, lutei; antheræ non caudatæ; styli rami divergentes, truncati, minute papillosi apice; achenia glabra, striata; pappus 0.

Habitat. Natal. Summit of Drakensberg, near Bushman's River Pass, 8–10,000 ped. alt., April; *M. S. Evans*, No. 715.

A much-branched undershrub, assuming a rounded compact form. Differs from *E. Dregeana* DC., the only other species of the genus, in size, shape, and indument of leaves, which in this species are not nearly so closely imbricated nor decussate, and in its much larger flower-heads, which are always solitary.

17. **Selago monticola,** sp. n. Caulis 2–3 ped. altus, lignosus, erectus, ramosus, in parte superiore, teres, tenuiter pilosus; folia sessilia, variantia ex linearibus ad lineari-oblonga, obtusa, papillosa, margine tenuiter acriterque dentato, solitaria in parte inferiore caulis, fasciculata in parte superiore, utroque fasciculo 4–8-foliato, 2–6 lin. longa, 1–2 lin. lata; inflorescentia laxe corymbosus, cum divisionibus breviter et dense floris apice; bracteæ non attingentes apicem loborum calycis; flores minuti, cum bracteis ovato-oblongis, obtusis, concavis, apice basique tantum ciliatis; calyx 5-fidus, lobis subæqualibus, tubo brevioribus, ciliatis; corolla 5-fida, tubo calyci subæquante, lobis subæqualibus, obtusis tam longis quam tubus; capsula ovata, paullo longiore calyce.

Habitat. Natal. Sources of Inyasuti river, Drakensberg Mts., 6–7000 ped. alt., June, 1896; *M. S. Evans*, No. 655.

Quite unlike any species represented in the Natal Government Herbarium.

18. **Wahlenbergia depressa,** sp. n. Planta parva in cæspitibus densis confertis in saxis humidis jacens; caules tenuissimi, ramosi, cæspitosi, subrigidi, glabri, 2–8 poll. longi; folia alterna, exstipulata, sessilia, linearia, ciliata, glabra supra, 2–4 lin. longa, ½ lin. lata; inflorescentia axillaris et terminalis, solitaria, pedunculi ½–1 lin. longi; calyx 5-lobatus, tubo obconico, 1 lin. longo, lobis subulatis, ciliatis, bis vel ter longioribus tubo; corolla 5-lobata, lobis ovatis, acutis, tubo ad faucem patente, lobis calycis subæquante vel paullo longiore; stamina 5, filamenta subulata, antheræ oblongæ, stylus 3-lobatus, minute pubescens, in parte superiore; ovarium semi-inferum, 3-loculare, multis ovulis; capsulis vertice loculicide 3-valvis; semina multa, longitudinale costata, fusca.

Habitat. Natal. Near Van Reenen's Pass, Drakensberg Mts., 5–6000 ped. alt., March; *J. M. Wood*, No. 5977.

A small plant growing in dense tufts, and unlike any other species of the genus known to us. The small flowers are pale blue.

19. **Stachys rivularis,** sp. n. Caulis erectus, ramosus ex basi, piloso-hispidus, 1 vel plures ped. altus; folia oblongo-deltoidea, cordata basi, obtusa apice, inferiora breviter petiolata, superiora

sessilia et minora, margine crenato, tenuiter ciliata, pilosa infra in venis, scabra supra, 5–10 lin. longa, 2–4 lin. lata; verticillastri 2–6-flori; calyx 5-dentatus, dentibus acuminatis, cum paucis pilis dispersis in costis; corolla bis longior calyce; flores albi cum maculis roseis in segmento inferiore.

Habitat. Natal. Sandy soil on banks of Mooi River, 4550 ped. alt., Dec. 1896; *J. M. Wood*, No. 6252.

This species seems to be near to *S. nigricans* Bth., but differs in size and shape of leaves, cutting and indument of calyx, and relative size of corolla. It also, Mr. Schlechter informs us, approaches near to his *S. simplex*, a species we have not seen.

20. **Ornithogalum capillaris**, sp. n. Bulbus ovoideus, 3–5 lin. diam., plerumque cum 2 vel pluribus scapis, tunicæ chartaceæ, exteriores productæ, ¾–1¾ poll. ultra bulbum; folia 3–6, partem inferiorem caulis amplectentia, erecta, capillaria, glabra, ad 3 poll. longa extendentia; pedunculi graciles, 2–2½ poll. longi ad pedicellem infimum; racemi 2–3 poll. longi, laxe 8–12-flori, pedicellis adscendentibus, infimis ¾–1 poll. longis; bracteæ lanceolatæ, subulatæ ex basi lata, inferiores 2 lin. longæ; perianthium album, 1½–2 lin. longum, segmentis oblongis, ½ lin. latis pluribus nervis, non carinatum; stamina paullo breviora perianthio, filamenta linearia; stylus gracilis, ovario non longior.

Habitat. Natal. Near Newcastle; 3900 ped. alt., Jan.; *J. M. Wood*, No. 6511.

Differs from *O. pilosus* by size of bulb, colour of tunics, and number of leaves, which are not ciliated; and from *O. inandense* by indument of leaves, length of peduncle, pedicels, and bracts, and colour of flowers.

SHORT NOTES.

Cheviotland Rubi and Rosæ. — Last August I collected the following brambles and roses in Dist. 68 of *Topographical Botany*:—*Rubus rhamnifolius** Wh. & N. (one of the smaller forms). By Eglingham Burn.—*R. pulcherrimus** Neum. Alnmouth and neighbourhood.—*R. Selmeri** Lindeb. Eglingham.—*R. rusticanus** Merc. Common.—*R. danicus** Focke. Woods above Alnwick.—*R. mucronatus** Blox. Eglingham; Dunstanburgh Head. — *R. infestus** Weihe. Alnmouth.—*R. Drejeri** G. Jensen. North of Alnwick.—*R. radula** Weihe (the type). Common from the R. Coquet to Berwick, and from Morpeth to Newcastle (South Northumberland, 67, *Top. Bot.*).—Var. c. *echinatoides** Rogers. Dunstanburgh Head. —*R. Bellardi** Wh. & N. Hill above Eglingham.—*R. dumetorum** Wh. & N. Common.—Vars. a. *ferox** Weihe; and b. *diversifolius** Lindl. Alnmouth.—*R. corylifolius** Sm. Common.—Var. b. *cyclophyllus** Lindeb. Alnmouth.—*R. cæsius** L. Howick and Embleton. *Rosa pimpinellifolia* L. Alnwick.—*R. mollis* Sm. Common.—Var. b. *cærulea* Woods. Common.—*R. tomentosa* Sm. Very common.—Var. g. *sylvestris* Woods. Between Belford and Berwick.—*R. rubi-*

ginosa L. Between Belford and Berwick. — *R. glauca* Vill. (type), and var. i. *Bakeri* (Déségl.). Alnmouth. In this note I have put an asterisk where the plant does not appear to have been previously recorded for the vice-county. My father is responsible for the names. —F. A. Rogers.

Extinction of Deyeuxia stricta Kunth, var. borealis (Laestad.). —The severe gale of a few years ago, which caused such extensive and deplorable damage to the pine and larch forests of Scotland, is indirectly the cause to which may be attributed the disappearance of the above grass. It was first discovered by me in the August of 1888 in a small swamp immediately to the north-east of the landing-stage at Killin Pier, in Perthshire, as I was rushing through the rain to catch the train which was waiting at Killin Pier Station. Mr. F. T. Richards, my companion, kindly delayed the train for a few moments till I collected about a score of specimens of this rare northern grass. I at once sent a specimen to Mr. Arthur Bennett, enquiring if it was *Deyeuxia stricta*. He replied, "Yes, or *borealis*." Subsequently Prof. Hackel referred it to *borealis*, and under the name which heads this notice I distributed it through the Exchange Club in 1888. In 1891 I again visited the locality (which, on account of its proximity to such a public way, I had refrained from publishing), but found a saw-mill had been established in the immediate vicinity. This year, to my dismay, I found the swamp completely filled up with sawdust, and not a vestige of this alpine grass to be seen. Nor was a protracted search along the southern end of Loch Tay successful. I may add that the grass when growing bears a somewhat close resemblance to *Holcus lanatus*, and this resemblance was probably the cause of the grass escaping the attention of the numerous botanists who must have passed the swamp where both grasses grew together. A closer observation will, however, show that the growth of the *Deyeuxia* is more rigid and the panicle narrower, and of a darker tint. It will be remembered that the dredging of the Forfarshire locality for marl is said to have caused the extinction of *Deyeuxia stricta* and *Eriophorum alpinum*.—G. Claridge Druce.

A new British hybrid Sedge from Surrey.—Pfarrer G. Kükenthal, of Grub a/F, near Coburg, has written to say that he recently saw a "*Carex vulpina*" collected by me at Witley (May 6th, 1889) in Prof. Haussknecht's herbarium, which he pronounces to be *C. vulpina* × *paniculata*. I have kept a specimen, and see good reasons for accepting this determination. The plant grew among a great quantity of *C. paniculata*, together with a root or two of *C. vulpina*, which is quite rare in this part of the county, according to my experience. When mounting it, I actually began to write "*Carex paniculata*" on the sheet, though (believing at that time that hybrid sedges were very uncommon, with two or three notable exceptions, such as *C. axillaris* Good., *C. Boenninghausiana* Weihe, and *C. xanthocarpa* Degl.) I thought it to be only a remarkably strong form of *C. vulpina*. I believe that I have also gathered *C. paniculata* × *vulpina* near the river Eden, below Chiddington, W. Kent, where both parents were plentiful (May 2nd, 1894). It was a strong, hassocky plant, with the glumes of a much darker brown than I have ever seen in *C. vulpina*, but resembling it in general appearance. Owing to the early time of year at which both gatherings were made, no fruit was present; they were, in fact, hardly in full flower.—Edward S. Marshall.

Potentilla norvegica L.—In two or three localities near to, and on the Middlesex side of, the Thames, between Staines and Laleham, I have observed this plant for some years past; but at the end of August, in the present year, I have found it also on the Surrey side of the river, growing sparingly on fallow land near Thorpe Lee, Egham. Mr. G. Claridge Druce, to whom I sent specimens, states that he has collected this species in Berks and in Bucks. — E. Ferguson Shepherd.

Euphrasia gracilis Fries. — On Sept. 13th, during the present autumn, whilst looking over the vegetation covering a portion of the northern limits of Chobham Common, N.W. Surrey, my attention was attracted by the appearance of a *Euphrasia*, characterized by its minutely delicate details of inflorescence and bracts, which was quite new to me. My forwarding freshly-gathered specimens of this to Messrs. F. Townsend and G. C. Druce resulted in both these gentlemen readily concurring as to identity with the above-named species.—E. Ferguson Shepherd.

Nitella opaca in Worcestershire. — Mr. James Groves has kindly looked at and determined as above a plant I gathered at Newland, near Malvern, on July 20th. It was growing in considerable quantity in a small meadow pond. It is, I believe, new to the county.—Richard F. Towndrow.

The Mosses of the Upper Dovey.—The following mosses, collected in the watershed of the Upper Dovey during the twelve months ending last Whitsuntide, form a supplement to the list of Merionethshire mosses published in this Journal for 1896, p. 330. The nomenclature followed is that of *The Student's Handbook of British Mosses*, by H. N. Dixon and the Rev. H. G. Jameson. My thanks are due to Mr. Dixon for his kind help in determining several species:—*Sphagnum subsecundum* Nees, var. *turgidum* C. M.—*S. teres* Angstr. var. *subteres* Dixon. — *S. cuspidatum* Ehrh. var. *plumosum* N. & H.—*Catharinea crispa* James. This rare British moss is locally abundant on the banks of the Dovey, near its source.—*Polytrichum gracile* Dicks.—*Archidium alternifolium* Schp.—*Swartzia montana* Ldb.— *Seligeria pusilla* B. & S.— *Grimmia pulvinata* Sm.— *Barbula spadicea* Mitt.—*B. rubella* Mitt. var. *dentata* Braithw.—*Trichostomum crispulum* Bruch. — *T. mutabile* Bruch. and var. *littorale* Dixon.— *T. nitidum* Schp. — *Encalypta ciliata* Hoffm. — *Anœctangium compactum* Schwg.—*Zygodon lapponicus* B. & S.—*Orthotrichum anomalum* Hedw. var. *saxatile* Milde.—*O. cupulatum* Hoffm.—*Bartramia Oederi* Sw. — *Philonotis fontana* Brid. var. *compacta* Schp. — *P. calcarea* Schp.—*P. capillaris* Ldb.—*Mnium cuspidatum* Hedw.—*M. serratum* Schrad. — *Neckera pumila* Hedw. var. *Philippiana* Milde. — *Pterogonium gracile* Sw.—*Thuidium delicatulum* Mitt. Fairly abundant in two localities: on the banks of the Dovey at an elevation of 1500 ft., and in a little dingle much lower down the valley. I also gathered it in June, 1897, on rocks at the waterfall at Rhiwargor, near Lake Vyrnwy, Montgomeryshire. This very rare species was first found in this country by Mr. Holt in 1885 at Tyn-y-groes, in Merionethshire, and it has also been found in the Lake District.—*Orthothecium intricatum* B. & S. — *Eurhynchium Swartzii* Hobk. — *Hypnum uncinatum* Hedw.—*H. cupressiforme* L. var. *ericetorum* B. & S., and var. *elatum* B. & S. (cfr.).—*H. eugyrium* Schp.—May Roberts.

NOTICES OF BOOKS.

Orchidacearum Genera and Species. Exposuit Fritz Kraenzlin. 8vo. Vol. i. Fasc. 1–3, pp. 1–192. Berlin: Mayer and Müller. 1897. Price 60 pf. per sheet of 16 pages to subscribers to the whole work; 70 pf. per sheet to subscribers to single volumes.

The number of species included in Lindley's *Genera and Species of Orchidaceous Plants* is estimated by the author at 1980, and the work was ten years in execution, it having proved "a most laborious task to examine with the necessary care so large a number of plants of a very intricate structure in a dried state." Botanists have a better opportunity now than had Lindley of examining live orchids. Many species, in fact, owe their introduction to science to the horticulturist, who, to his credit, is generally liberal in supplying workers with fresh flowers, though not always so willing to divulge the exact native locality of a new species. But there are still many which are known only from dried specimens, and the quantity of material has increased enormously since Lindley's time. Add to this the increase in the literature of the subject, and it becomes evident that a task which sixty years ago was difficult and laborious is by no means less so now. It was on this account that the greatest exponent of the order since Lindley, the younger Reichenbach, shrank from, or at any rate made no attempt at, a revision of the group as a whole—unless such revision exists in MS. with his ill-fated collection at Vienna. One might have looked to Kew or the British Museum for the much-desired continuation of the *Orchidaceous Plants* and the *Folia Orchidacea*, and many valuable contributions have emanated from both these institutions, associated with the names of Robert Brown, Sir Joseph Hooker, and Messrs. Ridley and Rolfe. But it has been left to Berlin to produce, in the fascicles now before us, the beginning of a modern account of the genera and species of orchids. We say "the beginning" advisedly. The 192 pages contain about 170 species. Bentham, in the *Genera Plantarum*, fourteen years ago, gave between 4500 and 5000 as the number then known, and his estimate would fall considerably below the mark at the present day. Observing the same proportion, therefore, Prof. Kraenzlin may look forward to a work of nearly 6000 pages! Six volumes are contemplated, and the distribution of the tribes is partly announced in the very few words of introduction to be found on the inside of the cover of the first fascicle. Vol. i. contains "*Cypripedieæ* and *Ophrydeæ*"; vol. ii. "*Dendrobieæ* and the *Bulbophyllineæ*"; vol. iii. "the Monopodials"; while "the distribution of the remaining groups among the vols. iv. to vi. cannot be fixed with absolute certainty."

The book begins very abruptly. Presumably an introduction will be at some time forthcoming, and will perhaps include an ordinal diagnosis. But the bare expression "Diandræ" needs elaboration or explanation, especially as the other sub-order "Monandræ Orchidaceæ" is characterized by nearly a page of description. The omission was probably an oversight, and is, we regret to find, only one of numerous instances, which are evidences of insufficient care, due perhaps to a too hasty publication. Thus, in the clavis to the first section of *Cypripedium*, (*Calceolaria*), the third species is *C. Henryi* Franchet; this turns out to be an error for *C. Henryi* Rolfe, which is quoted on p. 17 from the Kew Bulletin of 1592! The references as a whole are very bad: it is hardly possible to look at any one page without finding something wrong, inappropriate, or inconsistent. *Cypripedium* in the list of synonyms which follows the account of a species is written in full, or variously contracted to *Cypriped.*, *Cyprip.*, *Cypr.*, *Cyp.*, or *C.* We think the reference to the accepted specific name should immediately follow the author's name before the diagnosis. If, however, it is placed after the latter, it should be typographically distinguished from the synonyms; by putting everything in italics, as Dr. Kraenzlin does, nothing is distinct. The arrangement and punctuation of the synonymy, as well as the actual citations, leave much to be desired. The most lately published pages afford similar instances. Thus, on p. 185, in the clavis of the *Macroceratitæ* section of *Habenaria*, species 10 is "*H. Melvillei* Rchb. f."; on the next page it reads, "*H. Melvillei* Ridley." The correct citation is *H. Melvillii* Ridley, while the collector was H. C. Dent, not "Deus," and the specimen was from herb. Cosmo Melvill, not "Correo Melville." In the diagnosis the plant is described as "foliis paucis (?)" "spica ?—"; but Mr. Ridley's original description in this Journal is not doubtful on these points: he says "folia duo," "flores duo magni," and Dr. Kraenzlin might have seen the type at the British Museum, where he is always a welcome visitor. On p. 188 *H. Pringlei* B. L. Robinson is kept up as a distinct species, but, singularly enough, appears again with the same reference as a synonym of *H. macroceratitis* on p. 192. As the species was described from a single number of Pringle's Mexican plants, and the number is cited under the species with no suggestion that it is only "in part," it is difficult to see that this can be anything but a blunder.

We fear these symptoms of hasty production are not confined to the literary side of the work. Reviewers in the *Gardeners' Chronicle* and the *Orchid Review* have shown, and with good reason, that the views taken of the species of *Cypripedium* and their affinities are open to criticism. As regards generic distinctions, which, after all, must, within limits, be largely matter of personal opinion until we get some more concrete notion of what is a genus, Dr, Kraenzlin follows Bentham in his delineation of Diandræ; except that he includes *Selenipedium* with *Cypripedium*. A serious omission is that of any reference to a paper by Mr. Rolfe in the *Orchid Review* for 1896, where an arrangement of that suborder is sketched out, and three new genera are proposed.

Finally, we must take exception to the publication of MS. names in a list of synonyms; it serves no useful purpose, and there are enough synonyms already. The citation of "*Orchis longicornu* Pavon MSS. in herb. Boissier-Barbey," adds nothing to our knowledge of *Habenaria macroceratitis;* and "*Orchis tragodes* Steven MSS.," "*Serap. neglecta* de Forest MSS.," are other examples of this pernicious habit.

Besides the Diandræ, the three fascicles already issued include part of the tribe *Ophrydeæ*, viz. the whole of the section *Ophrydinæ*, with five genera: *Ophrys*, *Orchis*, *Serapias*, *Aceras*, and *Anacamptis*, and the beginning of section *Habenarieæ*, including *Neotinea* and twenty species of *Habenaria*.

Dr. Kraenzlin's diagnoses, which are, of course, in Latin, are sufficiently full, and we are glad to note that he gives measurements. They are followed by critical and other remarks in German, and, with the exception of the synonymy, the text on the whole is clear and well arranged. It is with some regret that we are unable to review the parts more favourably; but a work of such importance demands the very utmost care in production as well as in elaboration. We would suggest that a careful monograph of one of the tribes would be a more useful and more permanent contribution to orchidology than a hasty, and therefore necessarily incomplete and inaccurate, revision of the whole order.

A. B. R.

Synoptical Flora of North America. Vol. I., part I., fascicle II. Polypetalæ from the Caryophyllaceæ to the Polygalaceæ. By ASA GRAY, LL.D., continued and edited by BENJAMIN LINCOLN ROBINSON, Ph.D., with the collaboration of WILLIAM TRELEASE, JOHN MERLE COULTER, and LIBERTY HYDE BAILEY. Issued June 10, 1897. New York, Cincinnati and Chicago: American Book Company. London: W. Wesley. 8vo, pp. ix–xvi, 207–506.

An Illustrated Flora of the Northern United States, Canada, and the British Possessions. By NATHANIEL LORD BRITTON and Hon. ADDISON BROWN. Vol. II. Portulacaceæ to Menyanthaceæ. New York: Scribner. 8vo, pp. 1–643. 1897.

WE regret that, by an oversight, the first part of the *Synoptical Flora*, which was published Oct. 10, 1895, received no notice in these pages. As a continuation of Dr. Gray's work, mainly in accordance with his traditions—vol. II., it will be remembered, appeared in two parts during Gray's life-time in 1878 and 1884—it cannot fail to be of interest and importance, apart from its local value, to those who regard Gray as the greatest American systematist; and the more recent and in some respects more useful *Illustrated Flora* does not render the *Synoptical Flora* unnecessary. The fact that Dr. Robinson has been fortunate enough to secure the co-operation of such men as Dr. Trelease, Dr. Coulter, and Prof. L. H. Bailey—whose masterly monograph of *Vitaceæ* is a model of what such things should be—gives a special value to his undertaking, and shows that, while following on the lines of earlier workers, the most competent authorities on certain groups have thrown in their lot with him.

If one had to sum up the relative merits of the two Floras in a single sentence, it would probably be said that Dr. Britton's was the more useful for the field, and Dr. Robinson's for the herbarium and library. Dr. Britton's has the great advantage of having an illustration of every species, and this, in spite of the weight of the paper on which the volumes are printed, renders the book an invaluable travelling companion. Dr. Robinson and his colleagues give a much more extended bibliography of their plants, both under genera and species, although they do not give dates as Dr. Britton does—an omission which deteriorates from the usefulness of their citations. A combination of the two works, were such a thing possible, would result in a practically perfect Flora; as it is we may be thankful for the many excellences manifested by each.

The want of agreement which, in spite of all that they have written on the subject, still exists among American botanists with regard to nomenclature is emphasized by the appearance of these books. We cited Dr. Britton's present views when noticing the first part of his Flora.* Dr. Robinson treats the matter more briefly; he contents himself by saying that "well-known generic names have in some cases been conserved on the ground of usage, notwithstanding lack of priority": and "in the matter of specific names, the aim has been to follow the so-called Kew Rule, except when it leads to indefiniteness." We confess that we have never been able to understand "the so-called Kew Rule," nor do we know that it has been officially formulated. Our own sympathies, with certain exceptions taken in the notice already cited, are with Dr. Britton; but Dr. Robinson is fully justified in his criticism of the result of the precipitous and ill-considered action of the American reformers, which, as he truly says, "has led to the hasty restoration of a considerable number of names which have been again as quickly abandoned." Even names published in the *List of Pteridophyta*, &c. (1893–4) are set aside by Dr. Britton in his Flora in favour of yet more recent combinations, and it is evident from certain contributions to American periodicals that the game is still being carried on with spirit.

We are especially pleased to notice that Dr. Robinson's book does not countenance the introduction of trinominals for varieties in the manner which has become fashionable in American books. The omission of the abbreviation "var." between the specific and varietal appellation saves but little space, and to print, as Dr. Britton does, "Dodecatheon Meadia Frenchii," is calculated to mislead. Innovations like these afford striking testimony to the ingenuity of the American mind, but they do not add materially to the progress of science. Another point in Dr. Robinson's favour is that he does not encumber his pages with bogus "English" names, which serve no useful purpose: any one who is sufficiently advanced to talk of the "Wing-stemmed Ludwigia," to cite one of Dr. Britton's names, is not likely to be deterred from speaking of *Ludwigia alata*.

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* Journ. Bot. 1897, 202.

We are surprised to see that no more exact date of publication than the year is given by Dr. Britton for his Flora; we would suggest that a definite statement as to this for each part should appear with the concluding volume, which, we are glad to hear, may be expected almost immediately.

Traité de Botanique comprenant l'anatomie et la physiologie végétales et les familles naturelles. Par L. Courchet. 2 vols. 8vo, pp. viii, 1320, figs. 514. Paris: Baillière et Fils. 1897. Price 18 fr.

M. Courchet is Natural History Professor at the École Supérieure de Pharmacie, Montpellier, and the treatise on botany now under review is a *résumé* of the course of lessons which for the last seven years he has provided for the students at that institution. The method adopted in teaching, having been attended with excellent results, has been followed in the book. The latter, like many modern text-books, is divided into two parts—General and Special; and the first is by far the more satisfactory, a remark which also applies to similar works. Botanique Générale occupies pages 1–176, and supplies a fair introduction to the science, comprising an account of the general morphology of seed-plants, including internal structure and function (*i. e.* anatomy and physiology). The various members of the plant form the subjects of successive chapters in the usual sequence, and the author makes a point of including a brief account of the physiology of each organ; but physiology as a whole is most inadequately treated, and the student will get but a poor idea of the plant as a living thing, adapting itself in an infinite variety of ways to innumerable sets of conditions. The rest of the work is devoted to Botanique Spéciale, and is thus distributed among the great divisions:—Thallophytes, pp. 177–307; Bryophytes, 308–319; Vascular Cryptogams, 320–362; Phanerogams, 363–1295. A little sum in subtraction shows that nearly three parts of the work is given to a consideration of the families and orders of seed-plants. We are much impressed with the value of systematic botany, *i. e.* morphology in detail and the comparative value of the various organs in the study of affinity, with the geographical distribution of the groups thus determined. But, however successful M. Courchet may have found his method of treating the subject, it does not in our opinion justify the distribution we have indicated, and the great preponderance given to one group, even though that be generally conceded to represent the most advanced types.

Some omissions are quite surprising. Thus, while *Eurotium* is described as a typical ascomycetous fungus, there is no suggestion of a possibility of the existence of sexual organs or a sexual process; and the only mention of *Collema* is as an instance of a gelatinous lichen. Hepatics are dismissed in four pages, and the account consists mainly of a description of a by no means typical example, viz. *Marchantia.* Mosses are as badly treated. Phanerogams are introduced as "plants in which the organs of sexual reproduction, always highly differentiated, alone or accompanied by accessory organs, constitute a flower." The all-important idea of the seed does not enter into the definition.

We wonder how M. Courchet and his pupils got through the exhaustive list of natural orders which make up the bulk of the book. It is stated in the preface that the students took a real pleasure in the natural sciences, and we hope the remark applies also to this branch. But we are of the opinion that more pleasure, and profit too, would have been derived from a careful comparative study of one-fifth of the number of orders, and those by preference native. The best feature of the book is the illustrations, which are abundant and on the whole good; many are old friends, used without any acknowledgment of their source.

A. B. R.

ARTICLES IN JOURNALS.[*]

Bot. Centralblatt (No. 43). — A. Kattein, 'Der morphologische Werth des Centralcylinders der Wurzel.' — (No. 44). E. H. L. Krause, 'Floristische Notizen.'— (No. 45). L. J. Erikson, 'Zur Biologie und Morphologie von *Ranunculus illyricus.*' — (No. 46). J. Bornmüller, '*Rhamnus orbiculata* Bornm.'

Bot. Gazette (30 Oct.).—H. J. Webber, 'Fecundation of *Zamia* and pollen-tube apparatus of *Ginkgo*' (1 pl.). — L. S. Cheney, 'North American Species of *Amblystegium*' (3 pl.).—W. W. Bailey, 'Vernation of *Careya.*' — T. D. A. Cockerell, 'Abnormal leaves and flowers.' — A. P. Anderson, 'Stomata on bud-scales of *Abies pectinata.*'

Bot. Zeitung (16 Nov.). — R. Meissner, 'Über das mehrjährige Wachsen der Kiefernadeln.'

Bull. Soc. R. Bot. Belg. (11 Nov.).—T. Durand & E. Wildeman, 'Matériaux pour la Flore du Congo' (4 pl.).

Bull. Torrey Club (30 Oct.).—J. B. Ellis & M. Everhardt, 'New Fungi' (*Agyriella*, gen. nov.).—A. A. Heller, 'Plants of New Mexico.' —S. E. Jelliffe, 'Cryptogams found in the air.'

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[*] The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Erythea (29 Oct.). — C. A. Piper, *Rubus Hesperius*, sp. n. — C. Purdy, 'New W. American Lilies.'

Gardeners' Chronicle (20 Nov.).—*Ceropegia Woodi* (fig. 104).

Journal de Botanique (16 Sept.). — J. Réchin & R. Sébille, 'Excursion bryologique dans la Haute Tarentaise.'—P. Genty, *Carduus Gentianus*.—C. Sauvageau, 'Algues du Golfe de Gascogne' (cont.).

Journ. Linn. Soc. (1 Nov.).—W. & G. S. West, 'Desmids from Singapore' (2 pl.).—E. Horrell, 'Number of sterigmata and spores in *Agaricus campestris*' (1 pl.). — Miller Christy, '*Primula elatior* in Britain' (map).

Malpighia (fasc. vi.–viii.). — C. Avetta & V. Casoni, 'Aggiunto alla Flora Parmense.'—O. Saccardo, 'Sulla *Volutella ciliata*' (1 pl.). — C. Poma, 'Le Orchidee del Messico.' — C. Avetta, *Puccinia Lojkajana*. — G. Bresadola & P. A. Saccardo, 'Enumerazione dei Funghi della Valesia.' — L. Nicotra, 'Sul Calendario di Flora dell' Altipiano Sassarese.'—K. Dinter, 'Noterelle botaniche dall' Africa meridionale.'

Oesterr. Bot. Zeitschrift (Nov.). — R. v. Wettstein, 'Die Nomenclaturregeln der Beamten des Königlich bot. Gartens zu Berlin.'—C. Müller, 'Synopsis generis *Harrisonia*.'—J. Palacky, 'Zur Flora von Centralasien' (concl.). — V. Schiffner, 'Bryologische Mittheilungen aus Mittelböhmen.'—A. v. Degen, *Forsythia europæa*, *Wulfenia Baldaccii*, spp. nn.

BOOK-NOTES, NEWS, &c.

The *Annuaire du Conservatoire et du Jardin botaniques de Genève*, of which the first volume has just made its appearance, is the official organ of the institutions referred to. This first instalment contains papers by M. C. Arvet-Touvet on *Hieracia* and on a new genus (*Crepidopsis*) of *Cichoriaceæ*; Prof. Crépin revises the roses of some old Swiss herbaria; Dr. Kränzlin describes two new Habenarias; and M. Briquet gives the Report of the Garden and of the Delessert Herbarium for 1896.

In the last part (Nov. 11) of the *Bulletin de la Société Royale de Botanique de Belgique* Messrs. Durand & De Wildeman begin what is likely to be an important contribution to our knowledge of African plants, under the title "Matériaux pour la Flore du Congo." The help of numerous specialists has been obtained—among these we note Dr. Stapf, who will undertake the *Apocyneæ*, except the genus *Landolphia*, which will be contributed by "M. le directeur Thyselton Dyer." Dr. Dyer has been working at *Landolphia* since 1882, and was engaged in monographing it in 1893, so it may be hoped that before long the elaboration of the genus (which is not a large one) may be completed. Three excellent plates accompany the paper in the *Bulletin*.

One of the boldest statements we have seen for some time is that at the foot of a picture of a group of *Pyrethrum uliginosum* in the *Sketch* for Nov. 10—"Old-fashioned Michaelmas Daisies, from which many of our Chrysanthemums have been derived"!

Mr. James Goldie, of Guelph, Ontario, has just published privately the diary of the expedition on foot through Upper Canada, undertaken by his father, John Goldie, in 1819. We gave some account of Goldie's life in this Journal for 1886, pp. 272–4; the present elegant little brochure is of interest, not so much from a botanical standpoint—Goldie's botanical journal was destroyed by fire—as for the information it contains as to the features of the country visited. An excellent portrait forms a frontispiece to the little volume.

At the opening meeting of the Linnean Society on Nov. 4, Sir John Lubbock read a paper "On the Attraction of Flowers for Insects," which dealt chiefly with the points raised in three recently published memoirs by Prof. Plateau, who had attempted to show that the scents and not the colours of flowers serve to attract insects. Sir John Lubbock explained that his view, like that of Sprengel and Darwin, was that to insects flowers were indebted for both their scent and colour. Not only had the present shapes and outlines, colours, the scent, and the honey of flowers been gradually developed through the unconscious selection exercised by insects; but this applied even to minor points, such as the arrangement of lines, and the different shades of colour. Prof. Plateau had recorded a series of experiments on the dahlia, in which he showed that bees come to these flowers even when the ray-florets have been removed. Discussing this point, Sir J. Lubbock said it was somewhat singular that he should have selected as proving that insects are entirely attracted by scent a flower which had, so far as he knew, no scent at all. He gave several reasons for disputing the conclusions drawn by Prof. Plateau from his experiments, and recorded others made by himself which refuted them. He had selected species of flowers in which the scent is in one part and the coloured leaves in another, as, for instance, the *Eryngium amethystinum*. This flower is surrounded by brilliant blue bracts; and he found that if the two parts were separated, the bees came more often to the bracts than they did to the flowers themselves. He maintained, therefore, that the observations of Prof. Plateau did not in any way weaken the conclusions which had been drawn by Sprengel, Darwin, and others, and that it was still clear that the colours of flowers serve to guide insects to the honey, and in this way secure cross-fertilization.

The third fascicle of the Messrs. Linton's "Set of British Hieracia," which has just been distributed, contains, as its predecessors, a majority of endemic forms. Fourteen numbers, comprising eight species and six varieties, are found only in the British Isles. Of the rest, five occur in Scandinavia and six in other parts of Europe. The following note accompanies the fascicle:—"*H. petiolatum*, referred to in Mr. Hanbury's *Monograph*, p. 28, is fairly abundant in Glen Derry, at between 2000 and 3000 ft. alt., where alone it has been so far observed. *H. callistophyllum* occurs in Argyll, W. Inverness, Forfarshire, and perhaps in Dumfriesshire. *H. anglicum* var. *acutifolium*, mostly found in Aberdeenshire, occurs at high altitudes as Cairntoul, and also frequently as a woodland and riverside plant. *H. Langwellense*, since its first discovery in Caithness, has been found typical in the Moffat Hills, Dumfries. *H. lasiophyllum* differs from most of our list in being a Central European rather than a Scandinavian species. It is fairly frequent in the Grampians and in parts of Wales and two or three adjoining English counties. *H. murorum* var. *sarcophyllum:* this plant has been twice submitted to Herr Dahlstedt, who regards it as best placed under *sarcophyllum*, though not exactly the type. It occurs here and there in the Moffat Hills. *H. euprepes* is rare, though widely distributed in Scotland, being found in Perthshire and Dumfriesshire (Moffat); lately it has been discovered in N.E. Ireland. *H. vulgatum* var. *maculatum*, treated by Fries (Epicr.) as synonymous with *H. vulgatum*, is, in England and generally over Europe, a plant of botanical gardens or an escape. We issue No. 69 as *H. gothicum* Backh., because we know the British plant to which Backhouse applied Fries's name; whilst it is now uncertain what plant Fries exactly meant, and Scandinavian students of the genus have in consequence given up his name, a course in which we readily concur. Backhouse's variety *latifolium* is perhaps no more than a broad-leaved form, connected with the type by intermediates; its distinctness is, however, satisfactorily evidenced under the test of cultivation. *H. Ogweni* is described in the *Journal of Botany*, 1897, p. 407."

THE *Irish Naturalist* for October contains a biography and portrait of the late WILLIAM ARCHER, F.R.S., who died in Dublin on August 14. Mr. Archer was born 6 May, 1830, and was one of the founders (in 1849) of the Dublin Microscopical Club, and later took an important part in the meetings of the Dublin Natural History Society, in whose *Proceedings* many of his papers were published. His work was mainly devoted to the *Desmidiaceæ;* Mr. William Frazer, in the biography already referred to, says:—"When following out his favourite investigations, which related in greater part to the *Desmidiaceæ* and allied groups, he made long journeys to distant parts of Ireland, wherever he considered there was promising ground for their discovery. He also obtained exceptional acquaintance with German, as well as with Danish and other Scandinavian languages, and developed decided artistic talent far making accurate drawings of these minute and interesting forms, the life-history of which he devoted himself to work out and place on record. The writer is aware that many sleepless nights were spent in ceaseless observations of the conjugation and development of these objects; he thought himself well repaid if he could add something new to science, or contribute to clear up a dubious point respecting their growth." Mr. Archer also published papers in the *Quarterly Journal of Microscopical Science*, and elsewhere; three contributions from his pen appear in this Journal for 1871. In 1871 Mr. Archer was elected F.R.S., and in 1876 he was appointed

Librarian to the Royal Dublin Society, from which post he retired in 1895.

We regret that space will not allow us this month to notice the *Memorials, Journal and Botanical Correspondence of Charles Cardale Babington* (Cambridge: Macmillan & Bowes), which Mrs. Babington has brought together in a handsome volume. To her kindness we are indebted for the excellent portrait of the late Professor which will form the frontispiece to the Journal for this year, and which is reprinted from the *Memorials*.

Dr. Friedrich August Flückiger, the distinguished pharmacologist, died at Berne on December 11, 1894, and a Flückiger Memorial Fund was started early in the following year. After much deliberation, the Committee responsible for the application of the Fund decided to perpetuate the memory of the deceased professor in two ways—first, by awarding a gold medal for distinguished services in the promotion of pharmaceutical research; and second, by making grants in aid of research or for kindred purposes, or by giving prizes. The present year was fixed by the Committee as the date of the first award of the medal. The German and Swiss Pharmaceutical Associations (Apotheker-Verein) are alternately to serve as the means of communication between the trustees of the Fund and the recipients of the medal, and at the recent meeting of the German Apotheker-Verein at Strasburg, the President—Herr Frölich—announced that it had been decided to award the first medal to Mr. E. M. Holmes.

From an article on the award in the *Pharmaceutical Journal* we learn that Mr. Holmes was born at Wendover, in Buckinghamshire, a little village at the foot of the Chiltern Hills, on January 29, 1843. He received his scholastic education at Boston and Wimborne, and even during his early years manifested a great fondness for flowers; at the age of fourteen he was apprenticed to a pharmacist in Cheyne Walk, Chelsea. In 1863 he obtained the Pharmaceutical Society's bronze medal for an herbarium collected during the preceding twelve months. He had previously (1860) been awarded certificates in chemistry and pharmacy, botany and materia medica, at the Society's School of Pharmacy, and in due course he passed both the Minor and Major examinations and became registered as a pharmaceutical chemist. He began business in Plymouth, but commerce had no charms for him, and much of his time was devoted to the study of the flora of the district. In 1872 Mr. Holmes was appointed Curator of the Pharmaceutical Society's Museum in Bloomsbury, a position which he still holds, and in which he has rendered great services to economic botany.

Mr. J. B. Carruthers has just started for Ceylon, where he has been commissioned by the Planters' Association to undertake investigations into plant diseases.

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ERRATA.

P. 129, footnote. Mr. Jackson's citation is correct. See p. 199.
P. 149, footnote, for "1895" read 1896.
P. 243, line 18 from top, for "flexuosa" read flexuosum.
P. 256, last line but one, for "D. H. Scott" read G. B. Howes.
P. 361, line 14 from top, for "mobility" read motility.
P. 481, line 2 from top, for "sepals" read petals.
See also note on p. 475.

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